SHARP SERVICE MANUAL

SX910R24ATK//

COMMERCIAL

MICROWAVE OVEN

R-24AT

MODELS R-22AT
R-23AM
R-24AT

In interests of user-safety the oven should be restored to its original condition and only parts identical to those specified should be used.

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SHARP CORPORATION

SERVICING

WARNING TO SERVICE PERSONNEL

Microwave ovens contain circuitry capable of producing very high voltage and current. Contact with following parts will result in electrocution.
High voltage capacitors, High voltage transformers, Magnetrons, High voltage rectifier assembly, High voltage fuses, High voltage harness.

REMEMBER TO CHECK 3D

1) **D**isconnect the supply.
2) **D**oor opened, and wedged open.
3) **D**ischarge high two voltage capacitors.

WARNING: AGAINST THE CHARGE OF THE TWO HIGH-VOLTAGE CAPACITORS.

The two high-voltage capacitors remain charged about 60 seconds after the oven has been switched off. Wait for 60 seconds and then short-circuit the connection of the two high-voltage capacitors (that is, of the connecting lead of the high-voltage rectifier) against the chassis with use of an insulated screwdriver.

Sharp recommend that wherever possible fault-finding is carried out with the supply disconnected. It may, in some cases, be necessary to connect the supply after the outer case has been removed, in this event carry out 3D checks and then disconnect the leads to the primary of the power transformer. Ensure that these leads remain isolated from other components and the oven chassis. (Use insulation tape if necessary.) When the testing is completed carry out 3D checks and reconnect the leads to the primary of the power transformer.

REMEMBER TO CHECK 4R

1) Reconnect all leads removed from components during testing.
2) Replace the outer case (cabinet).
3) Reconnect the supply.
4) Run the oven. Check all functions.

Microwave ovens should not be run empty. To test for the presence of microwave energy within a cavity, place a cup of cold water on the oven turntable, close the door and set the microwave timer for one (1) minut. When the one minute has elapsed (timer at zero) carefully check that the water is now hot. If the water remains cold carry out 3D checks and re-examine the connections to the component being tested.

When all service work is completed and the oven is fully assembled, the microwave power output should be checked and microwave leakage test should be carried out.

R-23AM

SERVICE MANUAL

SHARP

COMMERCIAL
MICROWAVE OVEN

R-22AT/ R-23AM/ R-24AT

GENERAL IMPORTANT INFORMATION

This Manual has been prepared to provide Sharp Corp. Service engineers with Operation and Service Information.

It is recommended that service engineers carefully study the entire text of this manual, so they will be qualified to render satisfactory customer service.

CAUTION
MICROWAVE RADIATION

Service engineers should not be exposed to the microwave energy which may radiate from the magnetron or other microwave generating devices if it is improperly used or connected. All input and output microwave connections, waveguides, flanges and gaskets must be secured. Never operate the device without a microwave energy absorbing load attached. Never look into an open waveguide or antenna while the device is energized.

WARNING

Never operate the oven until the following points are ensured.
(A) The door is tightly closed.
(B) The door brackets and hinges are not defective.
(C) The door packing is not damaged.
(D) The door is not deformed or warped.
(E) There is not any other visible damage with the oven.

Servicing and repair work must be carried out only by trained service engineers.

All the parts marked "*" on parts list are used at voltages more than 250V.

Removal of the outer wrap gives access to potentials above 250V.

All the parts marked "Δ" on parts list may cause undue microwave exposure, by themselves, or when they are damaged, loosened or removed.

PRODUCT SPECIFICATIONS
GENERAL INFORMATION
APPEARANCE VIEW
OPERATING SEQUENCE
FUNCTION OF IMPORTANT COMPONENTS
SERVICING AND TROUBLESHOOTING GUIDE
TEST PROCEDURE
TOUCH CONTROL PANEL
COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE
MICROWAVE MEASUREMENT
WIRING DIAGRAM
PARTS LIST

SHARP CORPORATION

OSAKA, JAPAN

PRODUCT DESCRIPTION

SPECIFICATION

<table>
<tr><th>ITEM</th><th>DESCRIPTION</th></tr>
<tr><td>Power Requirements</td><td>230 - 240 Volts
50 Hertz
Single phase, 3 wire earthed</td></tr>
<tr><td>Power Comsumption</td><td>2.4 kW Approx. 11 A [R-22AT] / 2.9 kW Approx. 13 A [R-23AM, R-24AT]</td></tr>
<tr><td>Power Output</td><td>1500 W [R-22AT]/ 1900 W [R-23AM/24AT] nominal of RF microwave energy (measured by method of IEC 60705) Operating frequency 2450 MHz</td></tr>
<tr><td>Case Dimensions</td><td>Width 510mm   Height 335 mm   Depth 470mm</td></tr>
<tr><td>Cooking Cavity Dimensions</td><td>Width 330 mm   Height 180 mm   Depth 330mm</td></tr>
<tr><td>Control Complement for R-22AT/24AT</td><td>Touch Control System
<u>The combination of cooking time and microwave power</u>
The oven can be programmed a series of up to 3 cookling stages.
The combination of microwave power and cooking time that can be input as folllows.
<table>
<tr><th>Cooking Sequence</th><th>Micrwave power levelthat can be iused.</th><th>Cooking time that can be iused.</th></tr>
<tr><td>1 Stage only</td><td>0-100%</td><td>Max. 30 minutes</td></tr>
<tr><td rowspan="4">2 or 3 Stage</td><td rowspan="3">0-40% all stages</td><td>Max. 30 minutes any stages</td></tr>
<tr><td>Max. 60 minutes for 2 stages</td></tr>
<tr><td>Max. 90 minutes for 3 stages</td></tr>
<tr><td>50-100%</td><td>Max. 30 minutes for 3 stages</td></tr>
</table>
NOTE: If the oven used with the power level above 40% on any stage, the maximum cooking time is 30 minutes in total.
Microwave Power level
100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%
MANUAL / REPEAT key, NUMBER keys
POWER LEVEL key, STOP / CLEAR key
START Key, DOUBLE QUANTITY key
EXPRESS DEFROST key, SET key
CHECK key, VOLUME key</td></tr>
<tr><td>Control Complement for R-23AM</td><td>Electronic Timer (0 - 30 minutes)
Microwave Power level
100% 50% 20% 10%
MICROWAVE POWER SETTING buttons
START button</td></tr>
<tr><td>Set Weight</td><td>Approx. 33 kg</td></tr>
</table>

GENERAL INFORMATION

WARNING

THIS APPLIANCE MUST BE EARTHED

IMPORTANT

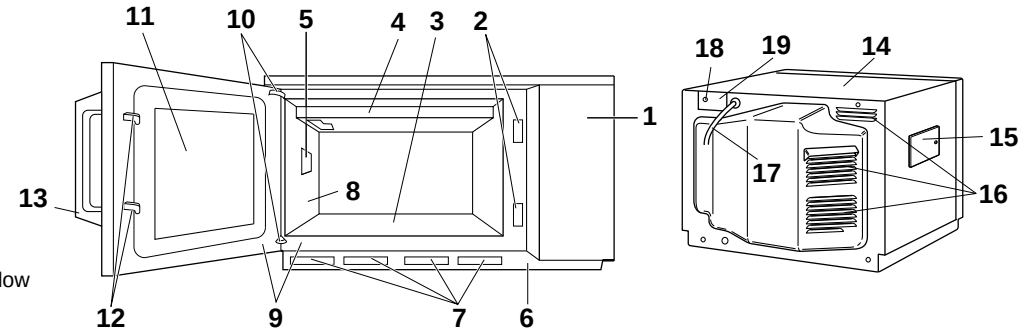
THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

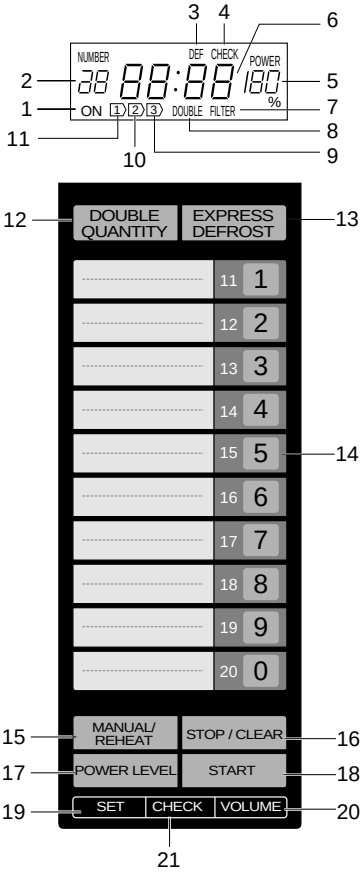
APPEARANCE VIEW

OVEN

1. Control panel
2. Hole for safety door latches
3. Ceramic floor
4. Splash cover
5. Oven light
6. Air intake filter
7. Air intake openings
8. Oven cavity
9. Door seals and sealing surfaces
10. Door hinges
11. Oven door with see-through window
12. Door safety latches
13. Door handle.
14. Outer cabinet
15. Removable cover over oven light bulb
16. Air vent openings
17. Power supply cord
18 Mounting plate
19 Screw for mounting plate



AUTO TOUCH CONTROL PANEL



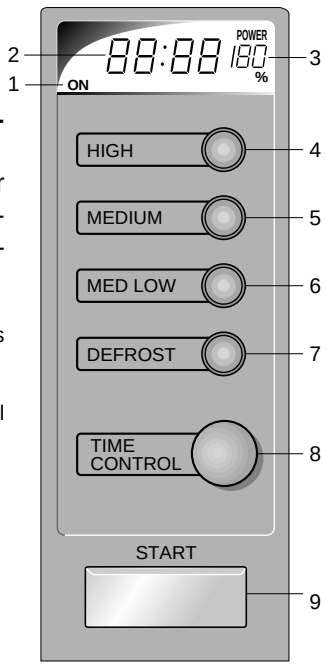
DISPLAY AND INDICATORS for R-22AT and R-24AT

Check indicators after the oven starts to confirm the oven is operating as desired.

1. Heating indicator
   This indicator shows cooking in progress.
2. Memory number indicator
3. Express defrost
4. Check mode indicator
5. Power level display
6. Time display
7. Filter indicator
8. Double quantity mode indicator
9. 3rd. stage indicator
10. 2nd. stage indicator
11. 1st. stage indicator

OPERATING KEYS

12. DOUBLE QUANTITY key
13. EXPRESS DEFROST key
14. NUMBER keys
15. MANUAL/ REPEAT key
16. STOP/CLEAR key
17. POWER SLEVEL key
18. START key
19. SET key
20. VOLUME key
21. CHECK key



DISPLAY AND INDICATORS for R-23AM

Check indicators after the oven starts to confirm the oven is operating as desired.

1. Cook indicator
   This indicator shows cooking in progress.
2. Time display
3. Microwave power level display

OPERATING KEYS

4. HIGH 100%
5. MEDIUM 50%
6. MED LOW 20%
7. DEFROST 10%

MICROWAVE POWER LEVEL buttons

8. TIME CONTROL
   Rotate the control to enter cooking time.
9. START button

INSTALLATION INFORMATION

When this commercial microwave oven is installed near other commercial electrical appliances, connect a lead wire to each equivalent potential terminal with equipotential marking between them (insert a lead wire between a washer and an earth angle, and screw them), as shown in Fig. A-1, to make sure that they are at equivalent potential.
If any lead wire is not connected between them, when person touch them he/she will get a electric shock.

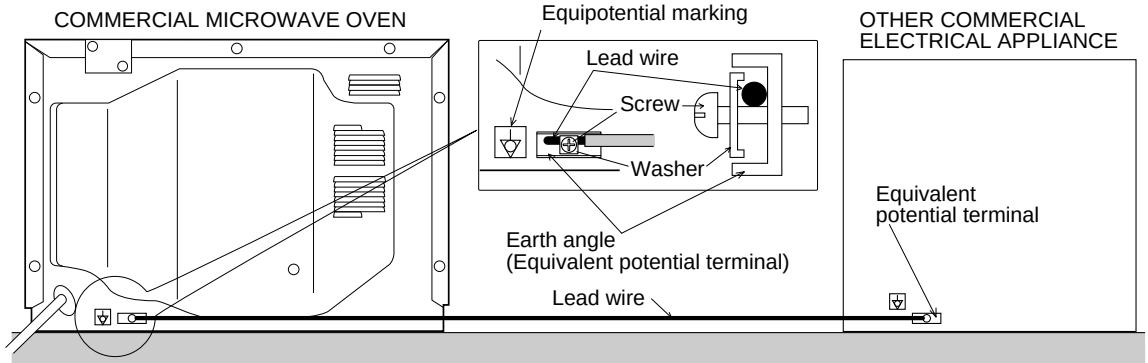


Figure A-1

OPERATION SEQUENCE

Closing the door activates all door interlock switches (1st latch switch, 2nd latch switch, 3rd latch switch and stop switch).

IMPORTANT
When the oven door is closed, the monitor switch contacts COM-NC must be open. When the microwave oven is plugged in a wall outlet (230 - 240 volts, 50Hz), the line voltage is supplied to the point A5+A7 in the control panel through the noise filter.

Figure O-1 on page 36

1. The digital display shows [.]

IDLE CONDITION

When the door is opened, the contacts of the 1st. latch switch SW1, 2nd. latch switch SW2, 3rd. latch switch SW3 and stop switch SW5 open, initiating the following:

Figure O-2 on page 36

1. A signal is input to the control unit energizing the coil of shut-off relay RY-1.
2. The shut-off relay RY-1 contacts close completing circuits to turn on the oven lamp, blower motor and stirrer motors.
3. If the door remains open, 60 seconds later the control unit de-energizes shut-off relay RY-1 turning off the oven lamp, blower motor and stirrer motors.

When the door is closed, the contacts of the 1st. latch switch SW1, 2nd. latch switch SW2, 3rd. latch switch SW3 and stop switch SW5 close. With the closing of the stop switch SW5 contacts, an additional circuit is provided which will permit the operation of the oven when one of the touch pads is depressed. Since the control is enabled through the stop switch SW5, the door must be closed before the touch pads will be effective. When the door is closed, a full 60 second IDLE condition is always provided for selecting and pressing the desired touch pads. A 60 second IDLE condition will also follow the end of each cook cycle.

MICROWAVE COOKING CONDITION

for R-22AT and R-24AT

Touch MANUAL/ REPEAT key and enter a desired cooking time with the touching NUMBER key. And then touch START key.

Function sequence Figure O-3 on page 37

CONNECTED COMPONENTS	RELAY
Oven lamp/ Blower motor/ Stirrer motors	RY1
High voltage transformer T1	RY3
High voltage transformer T2	RY4

for R-23AM

Enter a desired cooking time with the turning TIME CONTROL knob. And then push STARTbutton.

Function sequence Figure O-3 on page 37

CONNECTED COMPONENTS	RELAY
Oven lamp/ Blower motor/ Stirrer motors	RY1
High voltage transformer T1	RY2
High voltage transformer T2	RY3

1. The line voltage is supplied to the primary winding of the two high voltage transformers. The voltage is converted to about 3.3 volts A.C. output on the filament winding and high voltage of approximately 2000 volts A.C. on the secondary winding.
2. The filament winding voltage (3.3 volts) heats the magnetron filament and the high voltage (2000 volts) is sent to the voltage doubling circuit, where it is doubled to negative voltage of approximately 4000 volts D.C..
3. The 2450 MHz microwave energy produced in the magnetron generates a wave length of 12.24 cm. This energy is channelled through the waveguide (transport channel) into the oven cavity, where the food is placed to be cooked.
4. When the cooking time is up, a signal tone is heard and the relays RY3+RY4 (for R-22AT/24AT)/ RY2+RY3 (for R-23AM) go back to their home position. The circuits to the high voltage transformers T1+T2. The relay RY1 remains and oven lamp, blower motor and stirrer motors work for 1 minute.
5. When the door is opened during a cook cycle, the switches come to the following condition.

		CONDITION	
		DURING	DOOR OPEN
SWITCH	CONTACT	COOKING	(NO COOKING)
1st latch switch	COM-NO	Closed	Open
Monitor switch	COM-NC	Open	Closed
2nd latch switch	COM-NO	Closed	Open
Stop switch	COM-NO	Closed	Open
3rd latch switch	COM-NO	Closed	Open

The circuits to the high voltage transformers T1+T2 are cut off when the 1st latch, 2nd latch, 3rd latch and stop switches SW1+SW2+SW3+SW5 are made open. The blower motor BM, stirrer motors and oven lamp remains on even if the oven door is opened after the cooking cycle has been interrupted, because the relay RY1 stays closed. Shown in the display is the remaining time, but the program is cancelled if the oven is not started within 3 minutes.

6. MONITOR SWITCH CIRCUIT
The monitor switch SW4 is mechanically controlled by oven door, and monitors the operation of the 1st latch switch SW1.

6-1. When the oven door is opened during or after the cycle of a cooking program, the 1st, 2nd, 3rd latch and stop switches SW1+SW2+SW3+SW5 must open their contacts first. After that the contacts (COM-NC) of the monitor switch SW4 can be closed.

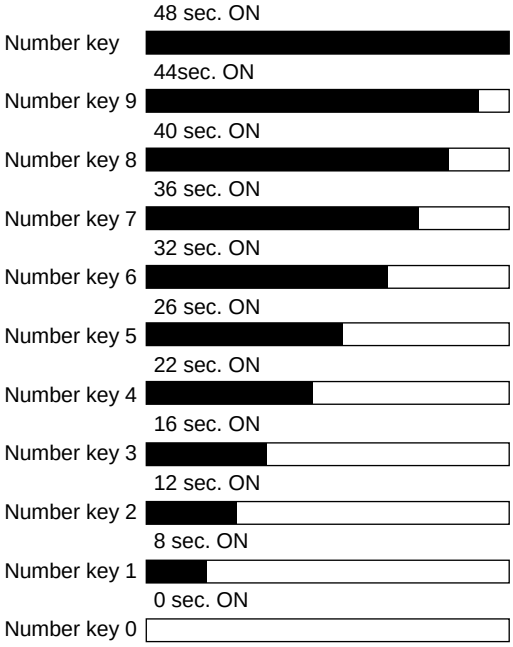
6-2. When the oven door is closed, the contacts (COM-NC) of the monitor switch SW4 must be opened first. After that the contacts (COM-NO) of the 1st, 2nd, 3rd latch and stop switches SW1+SW2+SW3+SW5 must be closed.

6-3. When the oven door is opened and the contacts of the 1st latch switch SW1 remain closed, remains closed, the fuse F2 F6.3A will blow, because the monitor switch is closed and a short circuit is caused.

MICROWAVE VARIABLE COOKING (for R-22AT and R-24AT)

When the microwave oven is preset for variable cooking

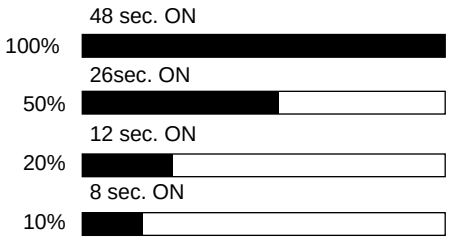
power, the line voltage is supplied to the high voltage transformers T1+T2 intermittently within a 48 second time base through the contacts of the relays RY3+RY4.
The following levels of microwaves power are given.



NOTE: The ON/OFF time ratio does not exactly correspond to the percentage of microwave power, because approx. 3 seconds are needed for heating up the magnetron filament.

MICROWAVE VARIABLE COOKING (for R-23AM)

When the microwave oven is preset for variable cooking power, the line voltage is supplied to the high voltage transformers intermittently within a 48 second time base through the contacts of the relays RY2+RY3.
The following levels of microwaves power are given.



NOTE: The ON/OFF time ratio does not exactly correspond to the percentage of microwave power, because approx. 3 seconds are needed for heating up the magnetron filament.

TWO MAGNETRON OPERATION SYSTEM

Two magnetrons MG1+MG2 are equipped in order to get higher microwave power output. The primary windings of the high voltage transformers T1+T2 are connected so that each magnetron can be oscillated alternatively according to the frequency of the power supply. Refer to the Figure B-1 and B-2.

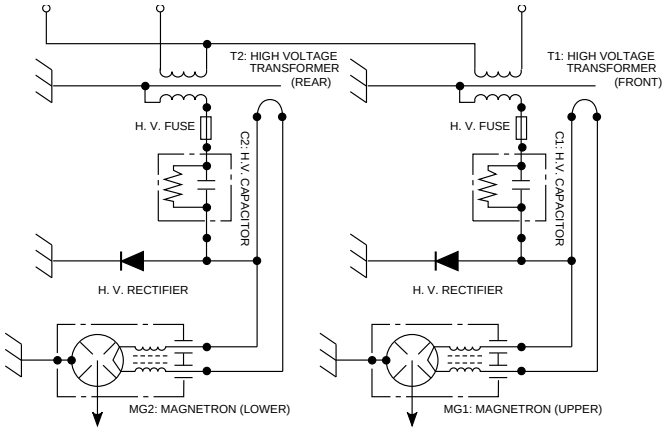


Figure B-1. High Voltage Circuit

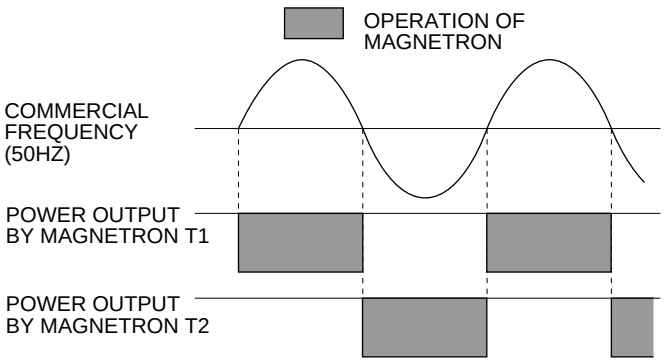


Figure B-2. Operation of Magnetron

FUNCTION OF IMPORTANT COMPONENTS

DOOR OPEN MECHANISM

1. The door release lever is pulled.
2. The upper latch head is lifted up by the linked door release lever.
3. The head lever is lifted up by the door release lever.
4. The joint lever is lifted up by the head lever.
5. The lower latch head is lifted up by the joint lever.
6. Now both latch heads are lifted up, so they can be released from the latch hook.
7. Now the door can be opened.

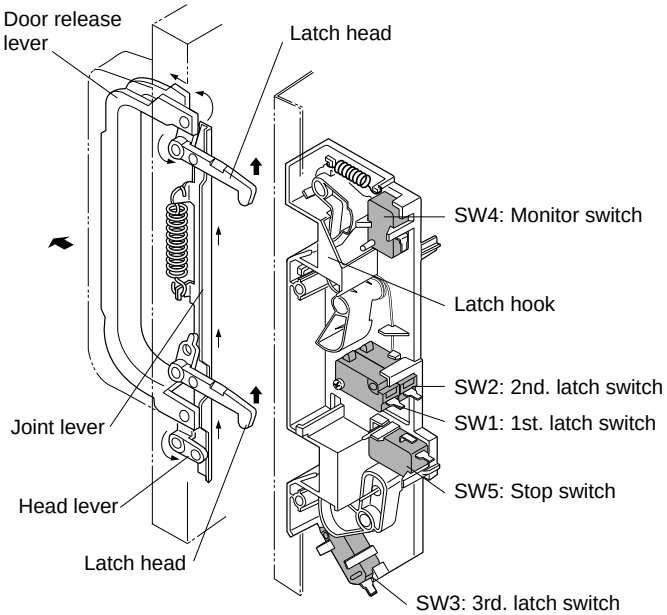


Figure D-1. Door Open Mechanism

1ST LATCH SWITCH SW1, 2ND LATCH SWITCH SW2, 3RD LATCH SWITCH SW3 AND STOP SWITCH SW5

1. When the oven door is closed, the contacts COM-NO must be closed.
2. When the oven door is opened, the contacts COM-NO must be opened.

MONITOR SWITCH SW4

The monitor switch SW4 is activated (the contacts opened) the upper latch head and switch lever A while the door is closed. The switch is intended to render the oven inoperative by means of blowing the fuse F2 F6.3A when the contacts of the 1st latch switch SW1 fail to open when the door is opened.

Function

1. When the door is opened, the monitor switch SW4 contacts close (to the ON condition) due to their being normally closed. At this time the 1st latch switch SW1 is in the OFF condition (contacts open) due to their being normally open contact switches.
2. As the door goes to a closed position, the monitor switch SW4 contacts are opened and 1st latch switch SW1 contacts are closed (On opening the door, each of these switches operate inversely.)
3. If the door is opened and the 1st latch switch SW1 contacts fail to open, the fuse F2 F6.3A blows simultaneously with closing of the monitor switch SW4 contacts.

CAUTION: BEFORE REPLACING A BLOWN FUSE F2 F6.3A TEST THE 1ST LATCH SWITCH SW1, MONITOR SWITCH SW4 AND MONITOR RESISTOR R1 FOR PROPER OPERATION. (REFER TO CHAPTER "TEST PROCEDURE").

MONITOR RESISTOR R1

The monitor resistor R1 prevents the fuse F2 F6.3A 250V bursting when the fuse F 2 F6.3A 250V blows due to the operation of the monitor switch SW4.

NOISE FILTER

The noise filter assembly prevents radio frequency interference that might flow back in the power circuit.

FUSE F1 F13A

If the wire harness or electrical components make a short-circuit, this fuse F1 (F13A) blows to prevent an electric shock or fire hazard.

FUSE F2 F6.3A 250V

1. If the wire harness or electrical components are short-circuited, this fuse blows to prevent an electric shock or fire hazard.
2. The fuse F2 also blows when 1st latch switch SW1 remains closed with the oven door open and when the monitor switch closes.

FUSE(S) F3, F4 M8A

If the wire harness or the high voltage transformers T1, T2 are short-circuited, these fuses F3 and /or F4 blow to prevent an electric shock or fire hazard.

HIGH VOLTAGE FUSE(S)

The high voltage fuse blows when the high voltage rectifier or the magnetron is shorted.

MAGNETRON TEMPERATURE FUSES TF1, TF2

The temperature fuses TF1, TF2 located on the top of the upper and lower waveguide, are designed to prevent damage to the magnetrons MG1, MG2. If an over heated condition develops in the tube due to blower motor failure, obstructed air ducts, dirty or blocked air intake, etc., the circuit to the magnetrons are interrupted. Under normal operation, the temperature fuses remains closed. However, when abnormally high temperatures are generated within the magnetrons, the temperature fuses will open at 150˚C causing the microwave energy to stop. The defective temperature fuses must be replaced with new rated ones.

OVEN TEMPERATURE FUSE TF4

The temperature fuse TF4, located on the side of the exhaust duct assembly, is designed to prevent damage to the oven by fire. If the food load is overcooked, by either error in cook time or defect in the control unit, the temperature fuse will open. Under normal operation, the oven temperature fuse remains closed. However, when abnormally high temperatures are generated within the oven

cavity, the oven temperature fuse will open at 120˚C, causing the oven to shut down. The defective temperature fuse must be replaced with new rated one.

BLOWER MOTOR TEMPERATURE FUSE TF3

This temperature fuse TF3 protects the blower motor against overheating. If its temperature goes above 120˚C because the blower motor is stalled or the ventilation openings are blocked, the contacts of the temperature fuse will open. The line voltage to the control unit will be cut off and the operation of the oven will be stopped. The defective temperature fuse must be replaced with a new one.

OVEN THERMISTOR (1)

The thermistor is a negative temperature coefficient type. The temperature in the exhaust duct is detected through the resistance of the thermistor.
If the temperature is high, the control panel will display “EE7” and the oven will stop to avoid overheating and catching fire.
If the thermistor is open, the control panel will display "EE6" and the oven will stop.

OVEN THERMISTOR (2)

This thermistor detects temperature of the oven cavity bottom plate. The thermistor is a negative temperature coefficient type. The temperature is detected through the resistance of the thermistor.
If the temperature is high, the control will display “EE17” and the oven will stop.

MAGNETRON THERMISTOR

The thermistor is a negative temperature coefficient type. The air temperature around the upper magnetron is detected through the resistance of the thermistor.
If the temperature is high, the control panel will display "EE17" and the oven will stop to protect the lower magnetron against overheat.
If the oven thermistor (2) and the magnetron thermistor are open at the same time, the control panel will display "EE16" and the oven will stop.

BLOWER MOTOR BM

The blower motor BM drives a blade which draws external cool air into the oven. This cool air is directed through the air vanes surrounding the magnetrons and cools the magnetrons. This air is channelled through the oven cavity to remove steam and vapours given off from the heating foods. It is then exhausted through the exhausting air vents at the oven cavity.

STIRRER MOTORS SM

The upper and lower stirrer motors SM drive stirrer antennas to stir the microwave radiation from the upper and lower waveguides.

OVEN LAMP OL

The oven cavity light illuminates the interior of the oven so that food being cooked can be examined visually through the door window without having to open the door. The oven lamp is on during the cooking cycle and idle condition.

TROUBLESHOOTING GUIDE

When troubleshooting the microwave oven, it is helpful to follow the Sequence of Operation in performing the checks. Many of the possible causes of trouble will require that a specific test be performed. These tests are given a procedure letter which will be found in the “Test Procedure”section.

IMPORTANT: If the oven becomes inoperative because of a blown fuse F2 F6.3A in the 1st latch switch SW1 - monitor switch SW4 - monitor resisitor R1 circuit, check the 1st latch switch SW1, monitor switch SW4 and monitor resistor R1 before replacing the fuse F2 F6.3A

POSSIBLE CAUSE AND DEFECTIVE PARTS

TESTPROCEDURE

CONDITION	PROBLEM	A	A	B	C	C	D	D	E	E	E	E	F	G	H	I	I	I	I	J	K	K	L	L	N	M		O	Q	Q	R		P
		MAGNETRON MG1	MAGNETRON MG2	HIGH VOLTAGE TRANSFORMER T1	HIGH VOLTAGE TRANSFORMER T2	H.V. RECTIFIER ASSEMBLY FOR MG1	H.V. RECTIFIER ASSEMBLY FOR MG2	H.V. WIRE HARNESS	H.V. CAPACITOR C1	H.V. CAPACITOR C2	1ST. LATCH SWITCH SW1	2ND. LATCH SWITCH SW2	3RD. LATCH SWITCH SW3	MONITOR SWITCH SW4	STOP SWITCH SW5	FUSE M8A F3	FUSE M8A F4	FUSE F13A F1	FUSE F6.3A F2	MAGNETRON TEMPERATURE FUSE TF1	MAGNETRON TEMPERATURE FUSE TF2	B. MOTOR TEMPERATURE FUSE TF3	OVEN TEMPERATURE FUSE TF4	MONITOR RESISTOR R1	MAGNETRON THERMISTOR	OVEN THERMISTOR (1)	OVEN THERMISTOR (2)	STIRRER MOTORS SM	BLOWER MOTOR BM	HIGH VOLTAGE FUSE(S)	OVEN LAMP OR SOCKET	NOISE FILTER	POWER SUPPLY CORD	FUSE HOLDERS	Shorted wire harness	Opened wire harness	TOUCH CONTROL PANEL	RELAY RY-1	RELAY RY-3 [for R-22AT/24AT], RY2 [for R-23AM]	RELAY RY-4 [for R-22AT/24AT], RY3 [for R-23AM]	FOIL PATTERN	Mis adjustment of switches	HOME FUSE or BREAKER	No power at wall outlet	Over the max. cooking time [for R-22AT/24AT]	Due to programme lock	Temperature of magnetron thermistor is high.	Temperature of oven thermistor (1) is high.	Temperature of oven thermistor (2) is high.	KEY UNIT [for R-22AT/24AT], or SWITCH UNIT [for R-23AM]
OFF CONDITION	" . " does not appear on display when power cord is plugged into wall outlet.																																											
	Control panel can not accept key in.														●																											●		
	Fuse F2 F6.3A blows when the door is opened.								●																																		
	Home fuse blows when power cord is plugged into wall outlet.																																										
	Fuse F1 F13A blows when power cord is plugged into wall outlet.																																										
	Oven lamp, fan motor and stirrer motors do not work for 1 minute when the door is opened or after cooking.																																										
	Fuse F2 F6.3A blows when power cord is plugged into wall outlet.													●																													
	Oven lamp does not light when door is opened. (Blower and stirrer motors work)																									●																	
	Blower motor does not work when door is opened. (Oven lamp lights and stirrer motors work)																							●																			
ON CONDITION	"EE 1" (Magnetron MG1 failure)	●		●		●		●								●									●																	
	"EE 2" (Magnetron MG2 failure)		●		●		●			●							●			●						●																	
	"EE 3" (Magnetron MG1 and MG2 failure)		●	●	●	●	●	●	●	●							●			●																						
	"EE 6" (Thermistor (1) failure)										●											●	●																				
	"EE 7" (Exhaust air temperature is high)																						●																			
	"EE 9" (Exceeded max. heating time) for R-22AT/ R-24AT																																									
	Oven lamp, blower motor and stirrer motors do not work.																																									
	Oven lamp does not work.																																									
	Blower motor does not work.																																									
	Oven does not stop after end of cooking cycle. (Oven lamp, blower motor and stirrer motors stop.)																																									
	Home fuse blows when starting the oven.																																									
	Oven goes into cook cycle but shuts down before end of cooking cycle.																																									
	It passed more than 1 minute after cooking but oven lamp, blower motor and stirrer motors do not stop.																																									
	"EE 16" (Thermistor of MG. and (2) are open.)																																									
	"EE 17" (Magnetron temperature is high.)																																									
	"EE 8" (Relay melt short)																																									
	Stirrer motors do not work.																																									

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

A **MAGNETRON TEST**

NEVER TOUCH ANY PART IN THE CIRCUIT WITH YOUR HAND OR AN INSULATED TOOL WHILE THE OVEN IS IN OPERATION.

CARRY OUT 3D CHECKS.

Isolate the magnetron from high voltage circuit by removing all leads connected to filament terminal.

To test for an open circuit filament use an ohmmeter to make a continuity test between the magnetron filament terminals, the meter should show a reading of less than 1 ohm.

To test for short circuit filament to anode condition, connect ohmmeter between one of the filament terminals and the case of the magnetron (ground). This test should be indicated an infinite resistance. If a low or zero resistance reading is obtained then the magnetron should be replaced.

MICROWAVE OUTPUT POWER (1 litre water load)
The following test procedure should be carried out with the microwave oven in a fully assembled condition (outer case fitted). Microwave output power from the magnetron can be measured by way of IEC 60705, i.e. it is measured by how much power the water load can absorb. To measure the microwave output power in the microwave oven, the relation of calorie and watt is used. When P(W) heating works for t(second), approximately P x t/4.187 calorie is generated. On the other hand, if the temperature of the water with V(ml) rises ΔT (°C) during this microwave heating period, the calorie of the water is V x ΔT.

The formula is as follows;
P x t / 4.187 = V x Δ T+ 0.55 x mc (T2-T0) P (W) = 4.187 x V x ΔT / t + 0.55 x mc (T2-T0)/t
Our condition for water load is as follows:
Room temperature (T0) ..... around 20°C Power supply Voltage ..... Rated voltage
Water load ..... 1000 g Initial temperature (T1) ..... 10±1°C
Heating time ..... 28 sec. [R-22AT] / 22sec. [R-23AM/24AT] Mass of container (mc) ..... 330 g
T2 ..... Final Temperature P = 150 x ΔT [R-22AT] / P = 190 x ΔT [R-23AM, R-24AT]

Measuring condition:
1. Container
   The water container must be a cylindrical borosilicate glass vessel having a maximum material thickness of 3 mm and an outside diameter of approximately 190 mm.
2. Temperature of the oven and vessel
   The oven and the empty vessel are at ambient temperature prior to the start the test.
3. Temperature of the water
   The initial temperature of the water is (10±1)°C.
4. Select the initial and final water temperature so that the maximum difference between the final water temperature and the ambient temperature is 5°C.
5. Select stirring devices and measuring instruments in order to minimize addition or removal of heat.
6. The graduation of the thermometer must be scaled by 0.1°C at minimum and be an accurate thermometer.
7. The water load must be (1000±5) g.
8. "t" is measured while the microwave generator is operating at full power. Magnetron filament heat-up time is not included.

NOTE: The operation time of the microwave oven is "t + 3" sec. (3 sec. is magnetron filament heat-up time.)

Measuring method:
1. Measure the initial temperature of the water before the water is added to the vessel.
   (Example: The initial temperature T1 = 11°C)
2. Add the 1 litre water to the vessel.
3. Place the load on the centre of the shelf.
4. Operate the microwave oven at HIGH until the temperature of the water rises by a value Δ T of (10 $\pm$ 2) K.
5. Stir the water to equalize temperature throughout the vessel.
6. Measure the final water temperature. (Example: The final temperature T2 = 21°C)
7. Calculate the microwave power output P in watts from above formula.

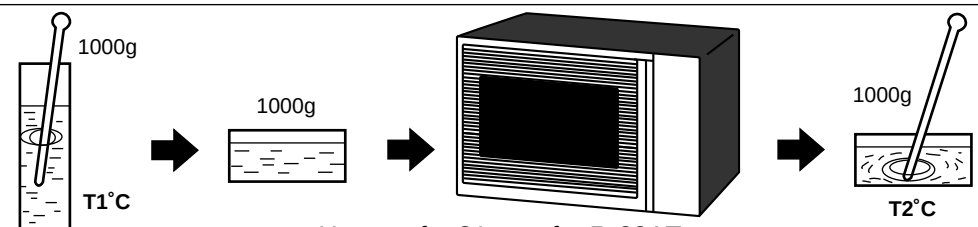
TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

Room temperature ..... T0 = 21°C
Initial temperature ..... T1 = 11°C
Temperature after (28 + 3) = 31 sec [for R-22AT]..... T2 = 21°C
Temperature after (22 + 3) = 25 sec [for R-23AM/24AT] ..... T2 = 21°C
Temperature difference Cold-Warm ..... ΔT1 = 10˚C
Measured output power
The equation is "P = 150 x ΔT" [for R-22AT] ..... P = 150 x 10°C = 1500 Watts
The equation is "P = 190 x ΔT" [for R-23AM/24AT] ..... P = 190 x 10°C = 1900 Watts

JUDGMENT: The measured output power should be within the range of ±15 % of the rated output power.

CAUTION: 1°C CORRESPONDS TO 150 WATTS [R-22AT]/ 190 WATTS [R-23AM, R-24AT]. REPEAT MEASUREMENT IF THE POWER IS INSUFFICIENT.



Heat up for 31 sec. for R-22AT
Heat up for 25 sec. for R-23AM/ R-24AT

MICROWAVE OUTPUT POWER (2000 cc alternative method)

The power output of this oven is rated using the method specified by IEC 60705. Full details of how to curry out this procedure can be found in the Sharp Technical Training notes which is available from Sharp Parts Centre (part number SERV-LITMW01).

The IEC-60705 procedure must be carried out using laboratory-type procedures and equipment. These requirements make the procedure unsuitable for routine performance checks.

NOTE: The following test method gives an indication of the output power only, it cannot be used to establish the actual/rated output power. If the true output power is required, then the IEC60705 test method must be used.

Alternative simplified method:

1. Place 2 litres of cold water (between 12°C and 20°C) in a suitable container.
2. Stir the water and measure the temperature in °C. Note temperature as T1.
3. Place the container in the microwave and heat the water for 56 sec. [R-22AT]/ 44 sec. [R-23AM, R-24AT] on fill power.
4. When the 56 sec. [R-22AT]/ 44 sec. [R-23AM, R-24AT] is completed, remove the container and stir the water. Note temperature as T2.
5. Calculate the output power using the following formula:
   R.F. Power Output = (T2 - T1) x 150 for R-22AT.
   R.F. Power Output = (T2 - T1) x 190 for R-23AM, R-24AT.

NOTE: The result from this test should be within the allowance of 2000cc alternative method. (±10%).

MICROWAVE LEAKAGE TEST

This oven should be tested for microwave leakage on completion of any repair or adjustment, following the procedure described in the Sharp Technical Training notes (part number SERV-LITMW01). The maximum leakage permitted in BS EN 60335-2-25 is 50W/m^2 (equivalent to 5W/m^2), however it is not normal to detect any significant leakage, therefore, any leakage which is detected should be investigated.

It is essential that only leakage detectors with current calibration traceable to National Physical Laboratories are used.

Suitable leakage detectors: CELTEC A100
APOLLO X1

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

B HIGH VOLTAGE TRANSFORMER TEST

> **WARNING: High voltage and large currents are present at the secondary winding and filament winding of the high voltage transformer. It is very dangerous to work near this part when the oven is on. NEVER make any voltage measurements of the high-voltage circuits, including the magnetron filament.**

CARRY OUT 3D CHECKS.
Disconnect the leads to the primary winding of the high voltage transformer. Disconnect the filament and secondary winding connections from the rest of the HV circuitry. Using an ohmmeter, set on a low range, it is possible to check the continuity of all three windings. The following readings should be obtained:-

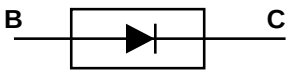
	R-22AT	R-23AM, R-24AT
a. Primary winding	approximately 1.8 Ω	approximately 1.2 Ω
b. Secondary winding	approximately 75 Ω	approximately 75 Ω
c. Filament winding	less than 1 Ω	

If the readings obtained are not stated as above, then the high voltage transformer is probably faulty and should be replaced.
CARRY OUT 4R CHECKS.

C HIGH VOLTAGE RECTIFIER ASSEMBLY TEST

CARRY OUT 3D CHECKS.

Isolate the high voltage rectifier assembly from the HV circuit. The high voltage rectifier can be tested using an ohmmeter set to its highest range. Connect the ohmmeter across the terminal B+C of the high voltage rectifier and note the reading obtained. Reverse the meter leads and note this second reading. The normal resistance is infinite in one direction and more than 100 kΩ in the other direction.
CARRY OUT 4R CHECKS.



HIGH VOLTAGE RECTIFIER

NOTE: FOR MEASUREMENT OF THE RESISTANCE OF THE RECTIFIER, THE BATTERIES OF THE MEASURING INSTRUMENT MUST HAVE A VOLTAGE AT LEAST 6 VOLTS, BECAUSE OTHERWISE AN INFINITE RESISTANCE MIGHT BE SHOWN IN BOTH DIRECTIONS.

D HIGH VOLTAGE CAPACITOR TEST

CARRY OUT 3D CHECKS.

A. Isolate the high voltage capacitor from the circuit.
B. Continuity check must be carried out with measuring instrument which is set to the highest resistance range.
C. A normal capacitor shows continuity for a short time (kick) and then a resistance of about 10MΩ after it has been charged.
D. A short-circuited capacitor shows continuity all the time.
E. An open capacitor constantly shows a resistance about 10 MΩ because of its internal 10MΩ resistance.
F. When the internal wire is opened in the high voltage capacitor shows an infinite resistance.
G. The resistance across all the terminals and the chassis must be infinite when the capacitor is normal.

If incorrect reading are obtained, the high voltage capacitor must be replaced.

CARRY OUT 4R CHECKS.

E SWITCH TEST

CARRY OUT 3D CHECKS.
Isolate the switch to be tested and using an ohmmeter check between the terminals as described in the following table.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

Table: Terminal Connection of Switch

Plunger Operation	COM to NO	COM to NC
Released	Open circuit	Short circuit
Depressed	Short circuit	Open circuit

COM; Common terminal,
NO; Normally open terminal
NC; Normally close terminal

If incorrect readings are obtained, make the necessary switch adjustment or replace the switch.

CARRY OUT 4R CHECKS.

F FUSE F3, F4 M8A TEST

CARRY OUT 3D CHECKS.
If the fuses F3 and/or F4 M8A are blown, there could be shorts in the high voltage transformers T1 and/ or T2 or there is a ground in wire harness. Check and/ or replace the high voltage transformers T1 and/ or T2 or repair the wire harness.

CARRY OUT 4R CHECKS.

CAUTION: Only replace fuses F3, F4 M8A with the correct value replacement.

G FUSE F1 F13A TEST

CARRY OUT 3D CHECKS.

If the fuse F1 F13A is blown, there could be a shorts or grounds in electrical parts or wire harness. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS.

CAUTION: Only replace fuse F1 F13A with the correct value replacement.

H FUSE F2 F6.3A TEST

CARRY OUT 3D CHECKS.

If the fuse F2 F6.3A is blown when the door is opened, check the 1st. latch switch SW1, monitor switch SW4 and monitor resistor R1.
If the fuse F2 F6.3A is blown by incorrect door switching replace the defective switch(s) and the fuse F2 F6.3A.

CARRY OUT 4R CHECKS.

CAUTION: Only replace fuse F2 F6.3A with the correct value replacement.

I TEMPERATURE FUSE TEST

1. CARRY OUT 3D CHECKS.
2. A continuity check across the temperature fuse terminals should indicate a closed circuit unless the temperature of the temperature fuse reaches specfied temperature as shown below.

	Open temperature	Close temperature	Display or Condition	Check point
Magnetron temperature fuse TF1	150˚C	Non resetable type	EE1	Magnetron MG1 Failure: Test magnetron MG1 and Blower fan motor.
Magnetron temperature fuse TF2			EE3	Magnetron MG1, MG2 Failure: Test magnetron MG1, MG2. Check blower fan motor and ventilation opening.
			EE2	Magnetron MG2 Failure: Test magnetron MG2 and Blower fan motor.
Blower motor temperature fuse TF3	120˚C	Non resetable type	Oven shut off	Check blower fan motor and ventilation opening or rocked rotating of blower fan motor.
Oven temperature fuse TF4	120˚C	Non resetable type	Oven shut off	Food has been burned in oven. Temperature of oven inside is very high.

3. CARRY OUT 4R CHECKS.

CAUTION: IF THE temperature fuse INDICATES AN OPEN CIRCUIT AT ROOM TEMPERATURE, REPLACE temperature fuse.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

J **MONITOR RESISTOR R1 TEST**

CARRY OUT 3D CHECKS.

Disconnect the leads from the monitor resistor R1. Using an ohmmeter and set on a low range. Check between the terminals of the monitor resistor R1.

The resistance of monitor resistor R1 should be read approx. 4.3Ω.

If incorrect readings are obtained, replace the monitor resistor R1.

CARRY OUT 4R CHECKS.

K **THERMISTOR TEST**

1. CARRY OUT 3D CHECKS.
2. Follow the procedures below for each thermistor.

2-1. MAGNETRON THERMISTOR TEST

Disconnect the connector of the magnetron thermistor from the switch harness. Measure the resistance of the magnetron thermistor with an ohmmeter. Connect the ohmmeter leads to the leads of the thermistor.

Room Temp.	59˚F (15˚C)	68˚F (20˚C)	77˚F (25˚C)
Resistance	Approx. 373 kΩ	Approx. 292 kΩ	Approx. 231 kΩ

If the meter does not indicate above resistance, replace the thermistor.

2-2. OVEN THERMISTOR (1) TEST

Disconnect the connector of the oven thermistor (1) from the switch harness. Measure the resistance of the oven thermistor (1) with an ohmmeter. Connect the ohmmeter leads to the leads of the thermistor.

Room Temp.	59˚F (15˚C)	68˚F (20˚C)	77˚F (25˚C)
Resistance	Approx. 373 kΩ	Approx. 292 kΩ	Approx. 231 kΩ

If the meter does not indicate above resistance, replace the thermistor.

2-3. OVEN THERMISTOR (2) TEST

Disconnect the two connectors of the magnetron thermistor and oven thermistor (2) from the switch harness. Measure the resistance of the oven thermistor (2) with an ohmmeter. Connect the ohmmeter leads to the leads of the thermistor.

Room Temp.	59˚F (15˚C)	68˚F (20˚C)	77˚F (25˚C)
Resistance	Approx. 16 kΩ	Approx. 13 kΩ	Approx. 11 kΩ

If the meter does not indicate above resistance, replace the thermistor.

3. CARRY OUT 4R CHECKS.

L **MOTOR WINDING TEST**

CARRY OUT 3D CHECKS.

Disconnect the leads from the motor. Using an ohmmeter, check the resistance between the two terminals.

Resistance of Blower motor should be approximately 52Ω.
Resistance of Stirrer motor should be approximately 8.8 kΩ.

If incorrect readings are obtained, replace the motor.

CARRY OUT 4R CHECKS.

M **NOISE FILTER TEST**

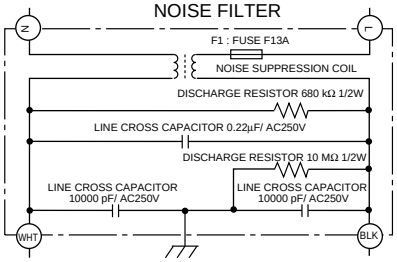
CARRY OUT 3D CHECKS.

Disconnect the leads from the terminals of noise filter. Using an ohmmeter, check between the terminals as described in the following table.

TEST PROCEDURES

PROCEDURE LETTER | **COMPONENT TEST**

MEASURING POINT	INDICATION OF OHMMETER
Between N and L	Approx. 680 kΩ
Between terminal N and WHIT	Short circuit
Between terminal L and BLK	Short circuit



If incorrect readings are absorbed, replace the noise filter.

CARRY OUT 4R CHECKS.

N HIGH VOLTAGE FUSE TEST

CARRY OUT 3D CHECKS.

If the high voltage fuse is blown, there could be a short in the high voltage rectifier or the magnetron. Check them and replace the defective parts and the high voltage fuse.

CARRY OUT 4R CHECKS.

CAUTION: Only replace high voltage fuse with the correct value replacement.

O TOUCH CONTROL PANEL ASSEMBLY TEST FOR R-24AT / R-22AT

The touch control panel consists of circuits including semiconductors such as LSI, IC, etc. Therefore, unlike conventional microwave ovens, proper maintenance cannot be performed with only a voltmeter and ohmmeter. In this service manual, the touch control panel assembly is divided into two units, Control Unit and Key Unit, troubleshooting by unit replacement is described according to the symptoms indicated.

1. Key Unit Note : Check key unit ribbon connection before replacement.
   The following symptoms indicate a defective key unit. Replace the key unit.
   a) When touching the pads, a certain pad produces no signal at all.
   b) When touching the pads, sometimes a pad produces no signal.
2. Control Unit
   The following symptoms may indicate a defective control unit. Replacing the control unit. Before replacing the control unit, perform the key unit test (Procedure P) to determine if control unit is faulty.

2-1 Programming problems.
   a) When touching the pads, a certain group of pads do not produce a signal.

2-2 Display problems.
   a) For a certain digit, all or some segments do not light up.
   b) For a certain digit, brightness is low.
   c) Only one indicator does not light.
   d) The corresponding segments of all digits do not light up; or they continue to light up.
   e) Wrong figure appears.
   f) A certain group of indicators do not light up.
   g) The figure of all digits flicker.

2-3 Other possible problems caused by defective control unit.
   a) Buzzer does not sound or continues to sound.
   b) Cooking is not possible.

CONTROL PANEL ASSEMBLY TEST FOR R-23AM

The control panel consists of circuits including semiconductors such as LSI etc. Therefore, unlike conventional microwave ovens, proper maintenance cannot be performed with only a voltmeter and ohmmeter. In this service manual, the touch control panel assembly is divided into three units, Control Unit, Switch Unit and Encoder Unit troubleshooting by unit replacement is described according to the symptoms indicated.

1. Switch Unit Note : Check the lead wire harness connections among big and small switch units and control unit before replacement.
   The following symptoms indicate a defective switch unit. Replace the switch unit.
   a) When touching the buttons, a certain button produces no signal at all.
   b) When touching the buttons, sometimes a button produces no signal.
2. Encoder Note : Check the lead wire connection between encoder and control unit before replacement.
   The following symptoms indicate a defective encoder. Replace the encoder.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

a) When rotating the encoder, the cooking time can not be entered.

3. Control Unit
   The following symptoms may indicate a defective control unit. Replacing the control unit. Before replacing the control unit, perform the switch unit test (Procedure P) to determine if control unit is faulty.

3-1 Programming problems.
   a) When touching the buttons, a certain group of buttons do not produce a signal.

3-2 Display problems.
   a) For a certain digit, all or some segments do not light up.
   b) For a certain digit, brightness is low.
   c) Only one indicator does not light.
   d) The corresponding segments of all digits do not light up; or they continue to light up.
   e) Wrong figure appears.
   f) A certain group of indicators do not light up.
   g) The figure of all digits flicker.

3-3 Other possible problems caused by defective control unit.
   a) Buzzer does not sound or continues to sound.
   b) Cooking is not possible.

P **KEY UNIT TEST FOR R-24AT / R-22AT**

CARRY OUT 3D CHECKS.

If the display fails to clear when the STOP/CLEAR pad is depressed, first verify the flat ribbon cable is making good contact, verify that the door sensing switch (stop switch) operates properly; that is the contacts are closed when the door is closed and open when the door is open. If the door sensing switch (stop switch) is good, disconnect the flat ribbon cable that connects the key unit to the control unit and make sure the door sensing switch is closed (either close the door or short the stop switch connector). Use the key unit matrix indicated on the control panel schematic and place a jumper wire between the pins that correspond to the STOP/CLEAR pad making momentary contact. If the control unit responds by clearing with a beep, the key unit is faulty and must be replaced. If the control unit does not respond, it is faulty and must be replaced. If a specific pad does not respond, the above method may be used (after clearing the control unit) to determine if the control unit or key pad is at fault.

	G 8	G 7	G 6	G 5	G 4	G 3	G 2
G 9	SET	START	DOUBLE QUANTITY	POWER LEVEL	17 7		
G10	CHECK	STOP / CLEAR	EXPRESS DEFROST	MANUAL / REPEAT	18 8		
G11	VOLUME	11 1	13 3	15 5	19 9		
G12		12 2	14 4	16 6	20 0		

CARRY OUT 4R CHECKS.

SWITCH UNIT TEST FOR R-23AM

1. CARRY OUT 3D CHECKS.
2. Remove the switch unit from the control panel, referring to control panel removal.
3. To test the switches (SW1-SW5) on the switch unit, check between the terminals of the connector CN-F as described in the following table by using ohmmeter when the switches are released and depressed.

O.C. : Open Circuit / S.C. : Short Circuit

Switches	Terminals	Released	Depressed
SW1	F1 - F4	O.C.	S.C.
SW2	F1 - F5	O.C.	S.C.
SW3	F2 - F4	O.C.	S.C.
SW4	F2 - F5	O.C.	S.C.
SW5	F3 - F4	O.C.	S.C.

4. If incorrect readings are obtained, replace the defective switch.
5. CARRY OUT 4R CHECKS.

Q **RELAY TEST**

CARRY OUT 3D CHECKS.

Remove the outer case and check voltage between Pin Nos. 5 and 7 of the connector (A) on the control unit with an A.C. voltmeter. The meter should indicate 230~240 volts, if not check control unit circuity.

RY1, RY3 and RY4 Relay Test For R-24AT / R-22AT
These relays are operated by D.C. voltage.

TEST PROCEDURES

PROCEDURE LETTER | **COMPONENT TEST**

Check voltage at the relay coil with a D.C. voltmeter during the microwave cooking operation.
DC. voltage indicated ..... Defective relay.
DC. voltage not indicated ..... Check diode which is connected to the relay coil. If diode is good, control unit is defective.

RELAY SYMBOL	OPERATIONAL VOLTAGE	CONNECTED COMPONENTS
RY1	APPROX. 19.0V D.C.	Oven lamp, Blower motor and Stirrer motors
RY3	APPROX. 16.0V D.C.	High voltage transformer 1
RY4	APPROX. 18.0V D.C.	High voltage transformer 2

RY1, RY2 and RY3 Relay Test For R-23AM
These relays are operated by D.C. voltage.
Check voltage at the relay coil with a D.C. voltmeter during the microwave cooking operation.
DC. voltage indicated ..... Defective relay.
DC. voltage not indicated ..... Check diode which is connected to the relay coil. If diode is good, control unit is defective.

RELAY SYMBOL	OPERATIONAL VOLTAGE	CONNECTED COMPONENTS
RY1	APPROX. 18.0V D.C.	Oven lamp, Blower motor and Stirrer motors
RY2	APPROX. 17.5V D.C.	High voltage transformer 1
RY3	APPROX. 17.5V D.C.	High voltage transformer 2

CARRY OUT 4R CHECKS.

R **PROCEDURES TO BE TAKEN WHEN THE FOIL PATTERN ON THE PRINTED WIRING BOARD(PWB) IS OPEN**

To protect the electronic circuits, this model is provided with a fine foil pattern added to the primary on the PWB, this foil pattern acts as a fuse. If the foil pattern is open, follow the troubleshooting guide given below for repair.

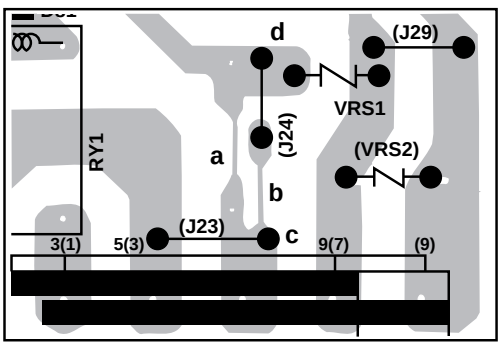
Problem: POWER ON, indicator does not light up.

CARRY OUT 3D CHECKS.

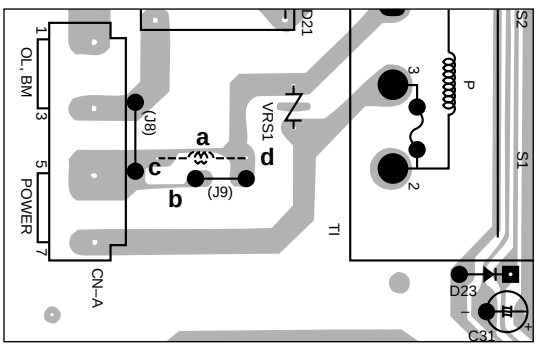
STEPS	OCCURRENCE	CAUSE OR CORRECTION
1	The rated AC voltage is not present at POWER terminal of CPU connector (CN-A).	Check supply voltage and oven power cord.
2	The rated AC voltage is present at primary side of low voltage transformer.	Low voltage transformer or secondary circuit defective. Check and repair.
3	Only pattern at "a" is broken.	*Insert jumper wire J24 and solder for R-24AT / R-22AT. *Insert jumper wire J9 and solder for R-23AM. (CARRY OUT 3D CHECKS BEFORE REPAIR)
4	Pattern at "a" and "b" are broken.	*Insert the coil RCILF2003YAZZ between "c" and "d". (CARRY OUT 3D CHECKS BEFORE REPAIR)

NOTE: *At the time of these repairs, make a visual inspection of the varistor for burning damage and examine the transformer with tester for the presence of layer short-circuit (check primary coil resistance). If any abnormal condition is detected, replace the defective parts.

CARRY OUT 4R CHECKS.



R-24AT / R-22AT



R-23AM

TOUCH CONTROL PANEL ASSEMBLY FOR R-24AT / R-22AT

OUTLINE OF TOUCH CONTROL PANEL

The touch control section consists of the following units as shown in the touch control panel circuit.

(1) Control Unit
(2) Key Unit

The principal functions of these units and the signals communicated among them are explained below.

1. Control Unit

Signal of key touch and oven function control are all processed by one microcomputer.

1) Power Supply Circuit

This circuit changes output voltage at the secondary side of the low voltage (T1) transformer to voltages required at each part by full wave rectifying circuit, constant voltage circuit, etc..

2) ACL Circuit

This is an Auto-clear Circuit, i.e., a reset circuit, which enables IC1 to be activated from initial state.

3) Power Synchronizing Signal Generating Circuit

This is a circuit for generating power synchronizing signal by virtue of the secondary side output of transformer T1. This signal is used for a basic frequency to time processing and so on.

4) Clock Circuit

This is a circuit for controlling clock frequency required for operating IC1.

5) IC1 (Main Processor)

This is a one-chip microcomputer, responsible for controlling the entire control unit.

6) IC2 (Memory Processor)

This is a memory IC, responsible for memory function.

7) Display Circuit

This is a circuit for driving display tubes by IC1 output.

8) Key Input Circuit

This is a circuit for transmitting key input information to IC1.

9) Sound-body Driving Circuit

This is a circuit for driving sound body by IC1 output.

10) Relay Driving Circuit

This is a circuit for driving output relay by IC1 output.

11) Stop Switch Circuit

This is a circuit for driving IC1 to detect door opening/closing.

12) Exhaust Air Temperature Detecting Circuit

This is a circuit for transmitting output change of thermistor (Oven thermistor (1)) to IC1.

13) High Voltage Monitoring Circuit.

This circuit detects problems in the magnetron / high voltage circuit by sensing a variation in the current flowing through the primary winding of the high voltage transformer.

During heating, the primary current of the high voltage transformers also flows through the primary winding of the current transformers CT1 and CT2. This causes a current to be induced in the secondary windings of CT1/CT2 and results in an AC voltage which is determined by R61/R62.

This AC voltage is then half wave rectified by D61/D62 and smoothed (filtered) by C61/C62.

This AC voltage is the input to the IN3 and IN5 ports of IC1, which determines if there is a magnetron / high voltage problem.

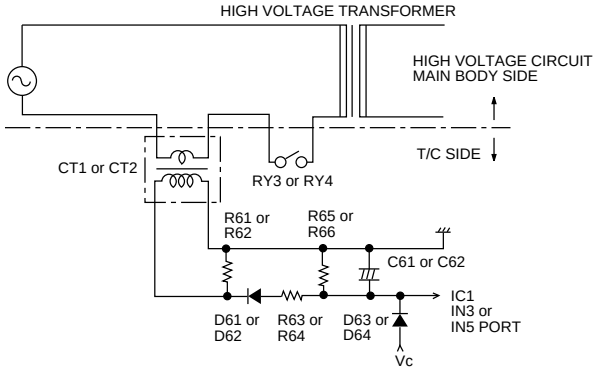


Figure T-1. High Voltage Monitoring Circuit For R-24AT / R22AT

14) Magnetron Temperature Circuit. (Detect Noload or Fan Lock)

This is a circuit for transmitting output change of thermistor (Magnetron thermistor) to IC1.

15) Oven Cavity Temperature Detecting Circuit.

This is a circuit for transmitting output change of thermistor (Oven thermistor (2)) to IC1.

2. Key Unit

The key unit is composed of a matrix circuit in which when a key it touched, one of signals P11, P12, P15, P16 and P17 generated by the LSI, is passed through the key and returned to the LSI as one of signals R0--R3. This model has 20 Memory pads. When the oven is shipped, Memory pad 1 to 10 are set as follows: fig.1.

Memory No.	Cook Time	Output Power
1	5 sec.	100%
2	10 sec.	100%
3	20 sec.	100%
4	30 sec.	100%
5	40 sec.	100%
6	50 sec.	100%
7	1 min.	100%
8	1 min.15 sec.	100%
9	1 min.30 sec.	100%
10	2 mins.	100%

(fig. 1)

This model has a double quantity pad. When the oven is shipped, Magnification "1.8" is preset in the double quantity pad. This model has an defrost pad. When the oven is shipped, defrost is set as follows: fig.2.

	1STAGE	2STAGE	3STAGE
POWER	50%	30%	20%
DEFROSTING TIME	0.2T+20sec.	0.13T+30sec.	0.67T-50sec.

(fig. 2)

NOTE :
"CHECK" indicator will flash at half of defrosting time.

CONTROL PANEL ASSEMBLY FOR R-23AM

OUTLINE OF CONTROL PANEL

The control section consists of the following units as shown in the control panel circuit.

(1) Control Unit
(2) Switch Unit
(3) Encoder Unit

The principal functions of these units and the signals communicated among them are explained below.

1. Control Unit

Signal of switch touch and oven function control are all processed by one microcomputer.

1) Power Supply Circuit

This circuit changes output voltage at the secondary side of the low voltage (T1) transformer to volatges required at each part by full wave rectifying circuit, constant voltage circuit, etc..

2) ACL Circuit

This is an Auto-clear Circuit, i.e., a reset circuit, which enables IC1 to be activated from initial state.

3) Power Synchronizing Signal Generating Circuit

This is a circuit for generating power synchronizing signal by virtue of the secondary side output of transformer T1.

This signal is used for a basic frequency to time processing and so on.

4) Clock Circuit

This is a circuit for controlling clock frequency required for operating IC1.

5) IC1 (Main Processor)

This is a one-chip microcomputer, responsible for controlling the entire control unit.

6) Display Circuit

This is a circuit for driving display tubes by IC1 output.

7) Switch Input Circuit

This is a circuit for transmitting switch input information to IC1.

8) Sound-body Driving Circuit

This is a circuit for driving sound body by IC1 output.

9) Relay Driving Circuit

This is a circuit for driving output relay by IC1 output.

10) Stop Switch Circuit

This is a circuit for driving IC1 to detect door opening/closing.

11) Exhaust Air Temperature Detecting Circuit

This is a circuit for transmitting output change of thermistor (Oven thermistor (1)) to IC1.

12) High Voltage Monitoring Circuit.

This circuit detects problems in the magnetron / high voltage circuit by sensing a variation in the current flowing through the primary winding of the high voltage transformer. During heating, the primary current of the high voltage transformers also flows through the primary winding of the current transformers CT1 and CT2. This causes a current to be induced in the secondary windings of CT1/CT2 and results in an AC voltage which is determined by R30/R31. This AC voltage is then half wave rectified by D30/D31 and smoothed (filtered) by C30/C31. This AC voltage is the input to the AN3 and AN4 ports of IC1, which determines if there is a magnetron / high voltage problem.

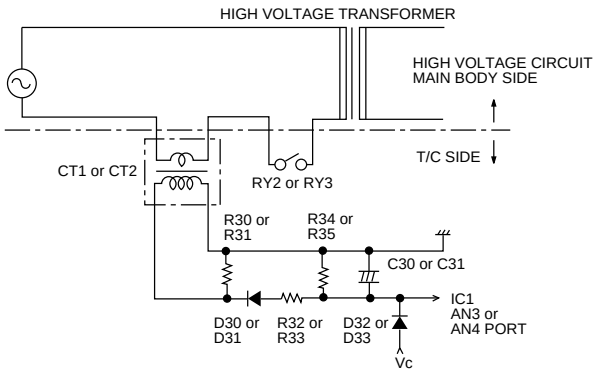


Figure T-1. High Voltage Monitoring Circuit For R-23AM

13) Magnetron Temperature Detecting Circuit.

This is a circuit for transmitting output change of thermistor (Magnetron thermistor) to IC1.

14) Oven Cavity Temperature Detecting Circuit.

This is a circuit for transmitting output change of thermistor (Oven thermistor (2)) to IC1.

2. Switch Unit

The switch unit is composed of a matrix circuit in which when a switch it touched, one of signals P43 - P45 generated by the LSI, is passed through the switch and returned to the LSI as one of signals P50 - P51.

3. Encoder

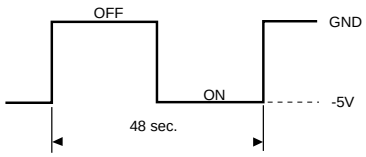
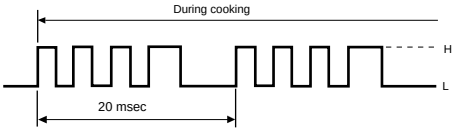
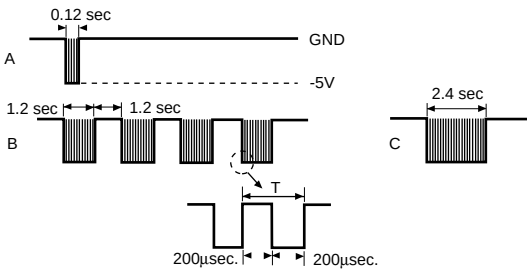
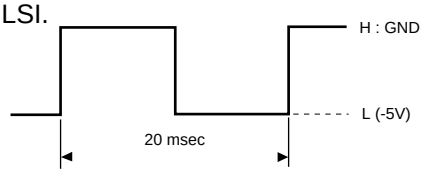
The encoder converts the signal generated by LSI into the pulse signal, and the pulse signal is returned to the LSI.

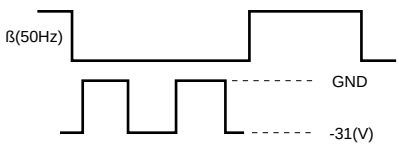
DESCRIPTION OF LSI FOR R-24AT / R-22AT

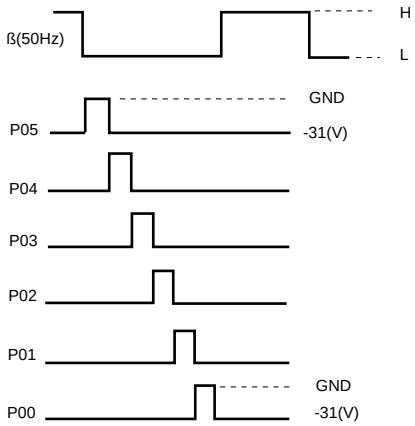
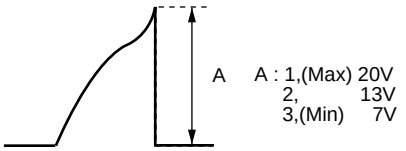
LSI(IZA646DR)

The I/O signal of the LSI(IZA646DR) is detailed in the following table.

Pin No.	Signal	I/O	Description
1	VREF	IN	**Reference voltage input terminal.** A reference voltage applied to the A/D converter in the LSI. Connected to GND.(0V)

<table>
<tr><th>Pin No.</th><th>Signal</th><th>I/O</th><th>Description</th></tr>
<tr><td>2</td><td>IN7</td><td>IN</td><td><u>Temperature measurement input: MAGNETRON THERMISTOR AND OVEN THERMISTOR (2).</u>
By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.</td></tr>
<tr><td>3</td><td>IN6</td><td>IN</td><td><u>Temperature measurement input: OVEN THERMISTOR (1).</u>
By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.</td></tr>
<tr><td>4</td><td>IN5</td><td>IN</td><td>A/D input for troubleshooting Magnetron 1.</td></tr>
<tr><td>5</td><td>IN4</td><td>IN</td><td><u>Terminal to change functions according to the model.</u>
Signal in accordance with the model in operation is applied to set up its function.</td></tr>
<tr><td>6</td><td>IN3</td><td>IN</td><td>A/D input for troubleshooting Magnetron 2.</td></tr>
<tr><td>7</td><td>IN2</td><td>IN</td><td>Connected to GND.(0V)</td></tr>
<tr><td>8</td><td>IN1</td><td>IN</td><td>Terminal not used.</td></tr>
<tr><td>9</td><td>IN0</td><td>IN</td><td>Connected to VC.</td></tr>
<tr><td>10</td><td>P47</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>11</td><td>P46</td><td>OUT</td><td>Memory (EEPROM) clock output.</td></tr>
<tr><td>12</td><td>P45</td><td>IN/OUT</td><td>Memory (EEPROM) data input/output.</td></tr>
<tr><td>13-14</td><td>P44-P43</td><td>OUT</td><td><u>Magnetron high-voltage circuit driving signal.</u>
To turn on and off the cook relay. In 100% power level operation, "L" level during cooking; "H" level otherwise. In other power level operation (90, 80, 70, 60, 50, 40, 30, 20, 10 or 0%), "H" and "L" level is repeated according to power level.
<table>
<tr><th>Power level</th><th>ON</th><th>OFF</th><th>Power level</th><th>ON</th><th>OFF</th></tr>
<tr><td>100%</td><td>48sec.</td><td>0sec.</td><td>40%</td><td>22sec.</td><td>26sec.</td></tr>
<tr><td>90%</td><td>44sec.</td><td>4sec.</td><td>30%</td><td>16sec.</td><td>32sec.</td></tr>
<tr><td>80%</td><td>40sec.</td><td>8sec.</td><td>20%</td><td>12sec.</td><td>36sec.</td></tr>
<tr><td>70%</td><td>36sec.</td><td>12sec.</td><td>10%</td><td>8sec.</td><td>40sec.</td></tr>
<tr><td>60%</td><td>32sec.</td><td>16sec.</td><td>0%</td><td>0sec.</td><td>48sec.</td></tr>
<tr><td>50%</td><td>26sec.</td><td>22sec.</td><td></td><td></td><td></td></tr>
</table>

</td></tr>
<tr><td>15</td><td>P42</td><td>OUT</td><td><u>Power supply output at thermistor detecting circuit.</u>
(Output -5V in cooking only, but apply high impedance to others to prevent thermistor from electrolytic corrosion occurrence.)</td></tr>
<tr><td>16</td><td>P41</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>17</td><td>P40</td><td>OUT</td><td><u>Oven lamp, Blower motor and Stirrer motors driving signal. (Square Waveform : 50Hz)</u>
To turn on and off the shut-off relay (RY1). The Square waveform voltage is delivered to the RY1 relay driving circuit and relays(RY3, RY4, COOK RELAY) control circuit.

</td></tr>
<tr><td>18-22</td><td>P37-P33</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>23</td><td>P32</td><td>OUT</td><td><u>Signal to sound buzzer.</u>
This signal is to control the 2.5kHz continuous signal.
A: key touch sound.
B: Guidance sound.
C: Completion sound.

</td></tr>
<tr><td>24</td><td>P31</td><td>IN</td><td><u>Signal synchronized with commercial power source frequency.</u>
This is basic timing for all time processing of LSI.

</td></tr>
</table>

Pin No.	Signal	I/O	Description
25	P30	OUT	Terminal not used.
26	CNVSS	IN	Connected to Vc.(-5V)
27	RESET	IN	**Auto clear terminal.** Signal is input to reset the LSI to the initial state when power is supplied. Temporarily set to "L" level the moment power is supplied, at this time the LSI is reset. Thereafter set at "H" level.
28	XIN	IN	**Internal clock oscillation frequency setting input.** The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to XOUT terminal.
29	XOUT	OUT	**Internal clock oscillation frequency control output.** Output to control oscillation input of XIN.
30/31	XCIN/XCOUT	IN/OUT	Terminal not used.
32	VSS	IN	**Power source voltage: -5V.** VC voltage of power source circuit input.
33	ø	OUT	Terminal not used.
34	R3	IN	**Signal coming from touch key.** When either one of G-12 line keys on key matrix is touched, a corresponding signal out of P11, P12, P14 - P17 will be input into R3. When no key is touched, the signal is held at "L" level.
35	R2	IN	**Signal similar to R3.** When either one of G-11 line keys on key matrix is touched, a corresponding signal will be input into R2.
36	R1	IN	**Signal similar to R3.** When either one of G-10 line keys on key matrix is touched, a corresponding signal will be input into R1.
37	R0	IN	**Signal similar to R3.** When either one of G-9 line keys on key matrix is touched, a corresponding signal will be input into R0.
38	VP	IN	**Anode (segment) of Fluorescent Display light-up voltage: -31V.** Vp voltage of power source circuit input.
39	P17	OUT	**Segment data signal.** The relation between signals and indicators are as follows: Signal Segment Signal Segment P24 ..... i P13 ..... f P23 ..... j,k P12 ..... e P17 ..... LB P11 ..... d P16 ..... UB P10 ..... c P15 ..... h P07 ..... b P14 ..... g P06 ..... a  **Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-6 line keys on key matrix is touched.
40	P16	OUT	**Segment data signal.** Signal similar to P17. **Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-5 line keys on key matrix is touched.
41	P15	OUT	**Segment data signal.** Signal similar to P17. **Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-4 line keys on key matrix is touched.
42-43	P14-P13	OUT	**Segment data signal.** Signal similar to P17.
44	P12	OUT	**Segment data signal.** Signal similar to P17. **Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-8 line keys on key matrix is touched.

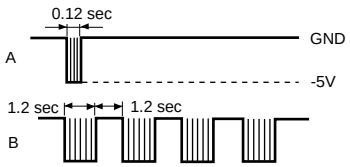
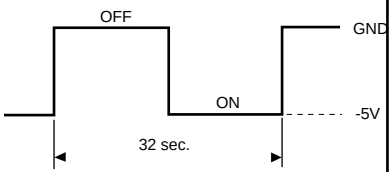
Pin No.	Signal	I/O	Description
45	P11	OUT	**Segment data signal.** Signal similar to P17. **Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to R0 - R3 terminal while one of G-7 line keys on key matrix is touched.
46	P10	OUT	**Segment data signal.** Signal similar to P17.
47-48	P07-P06	OUT	**Segment data signal.** Signal similar to P17.
49	P05	OUT	**Digit selection signal.** The relation between digit signal and digit are as follows: Digit signal Digit P05 ..... 1st. P04 ..... 2nd. P03 ..... 3rd. P02 ..... 4th. P01 ..... 5th. P00 ..... 6th. Normally, one pulse is output in every ß period, and input to the grid of the Fluorescent Display. 
50-54	P04-P00	OUT	**Digit selection signal.** Signal similar to P16.
55-57	P27-P25	OUT	Terminal not used.
58-59	P24-P23	OUT	**Segment data signal.** Signal similar to P17.
60	P22	OUT	**(Sound) Voltage level control terminal.** This terminal (P22) is to control volume level of buzzer sound with terminals P21. Since the volume level of buzzer sound depends on voltage energized, it is control level in 3 steps by combining signal levels for P22, P21. Relationship of signal level combination to sound volume level is shown in the following table, 1~3 in the table, however, are indicated in the descending order from the maximum level of sound volume through the minimum level. Sound Volume / P21 / P22: 1, (Max.) L L; 2, H L; 3, (Min.) L H  *At Output terminal P32, rectangular wave signal of 2.5kHz is output.
61	P21	OUT	**Sound level control signal.** Refer to above signal P22.
62	P20	IN	**Input signal which communicates the door open/close information to LSI.** Door closed; "H" level signal(0V). Door opened; "L" level signal(-31.0V).
63/64	AVCC/VCC	IN	Connected to GND.

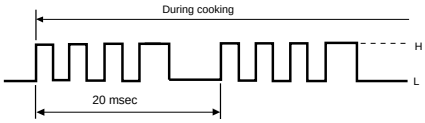
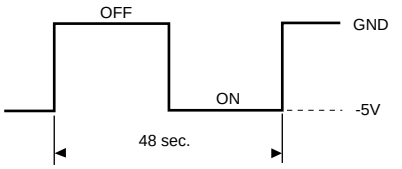
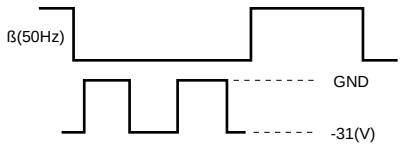
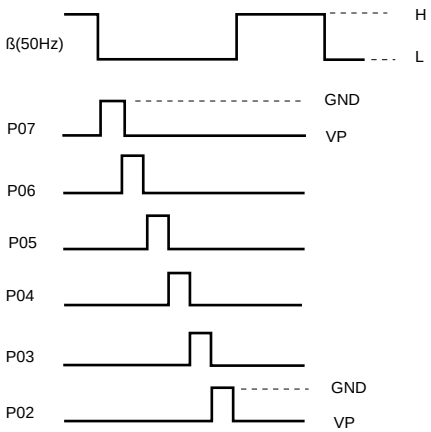
DESCRIPTION OF LSI FOR R-23AM

LSI(IZA648DR)

The I/O signal of the LSI(IZA648DR) is detailed in the following table.

Pin No.	Signal	I/O	Description
1	VCC	IN	Connected to GND.
2	VEE	IN	**Anode (segment) of Fluorescent Display light-up voltage: -35V.** Vp voltage of power source circuit input.
3	AVSS	IN	**Reference voltage input terminal.** A reference voltage applied to the A/D converter in the LSI. Connected to DC. (-5V)
4	VREF	IN	**Reference voltage input terminal.** A reference voltage applied to the A/D converter in the LSI. Connected to GND.

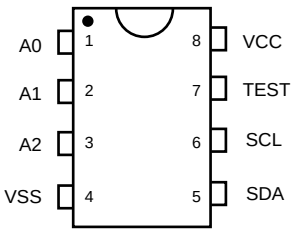
Pin No.	Signal	I/O	Description
5-6	AN7-AN6	IN	Terminal to switch the specification.
7	AN5	IN	Connected to GND.
8	AN4	IN	A/D input for troubleshooting Magnetron 1.
9	AN3	IN	A/D input for troubleshooting Magnetron 2.
10	AN2	IN	**Temperature measurement input: OVEN THERMISTOR (1).** By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.
11	AN1	IN	**Temperature measurement input: MAGNETRON THERMISTOR AND OVEN THERMISTOR (2).** By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.
12	P60	IN	**Input signal which communicates the door open/close information to LSI.** Door closed; "H" level signal (0V). Door opened; "L" level signal (-5.0V).
13	P55	OUT	**Power supply output at thermistor detecting circuit.** (Output -5V in cooking only, but apply high impedance to others to prevent thermistor from electrolytic corrosion ocurrence.)
14-16	P54-P52	OUT	Terminal not used.
17	P51	IN	**Signal coming from switch unit.** When either one of switches SW2 and SW4 on the switch unit is pressed, a corresponding signal out of P44 and P43 will be input into P51.
18	P50	IN	**Signal similar to P51.** When either one of switches SW1, SW3 and SW5 on the switch unit is pressed, a corresponding signal out of P43, P44 and P45 will be input into P50.
19	P47	OUT	**Signal to sound buzzer.** This signal is to control the 2.5kHz continuous signal. A: Switch touch sound. B: Completion sound. 
20	P46	OUT	Terminal not used.
21	P45	OUT	**Switch strobe signal.** Signal is applied to the switch unit. A pulse signal is input to P50 terminal while switch SW5 is pressed.
22	P44	OUT	**Switch strobe signal.** Signal is applied to the switch unit. A pulse signal is input to P50 or P51 terminal while switch SW3 or SW4 is pressed.
23	P43	OUT	**Switch strobe signal.** Signal is applied to the switch unit. A pulse signal is input to P50 or P51 terminal while switch SW1 or SW2 is pressed.
24	P42	IN	**Signal coming from encoder.** When the encoder is turned, the contacts of encoder make pulse signals. And pulse signals are input into P42.
25	INT1	IN	**Signal coming from encoder.** Signal similar to R42. Pulse signals are input into INT1.
26	INT0	IN	**Signal synchronized with commercial power source frequency.** This is basic timing for all time processing of LSI. 
27	RESET	IN	**Auto clear terminal.** Signal is input to reset the LSI to the initial state when power is supplied. Temporarily set to "L" level the moment power is supplied, at this time the LSI is reset. Thereafter set at "H" level.

<table>
<tr><th>Pin No.</th><th>Signal</th><th>I/O</th><th>Description</th></tr>
<tr><td>28-29</td><td>P71-P70</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>30</td><td>XIN</td><td>IN</td><td><u>Internal clock oscillation frequency setting input.</u>
The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to XOUT terminal.</td></tr>
<tr><td>31</td><td>XOUT</td><td>OUT</td><td><u>Internal clock oscillation frequency control output.</u>
Output to control oscillation input of XIN.</td></tr>
<tr><td>32</td><td>VSS</td><td>IN</td><td><u>Power source voltage: -5V.</u>
VC voltage of power source circuit input.</td></tr>
<tr><td>33</td><td>P27</td><td>OUT</td><td><u>Oven lamp, Blower motor and Stirrer motor driving signal (Square Waveform : 50Hz).</u>
To turn on and off the shut-off relay (RY1). The Square waveform voltage is delivered to the RY1 relay driving circuit and relays (RY2, RY3, COOK RELAY) control circuit.
 
</td></tr>
<tr><td>34</td><td>P26</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>35-36</td><td>P25-P24</td><td>OUT</td><td><u>Magnetron high-voltage circuit driving signal.</u>
To turn on and off the cook relay. In100% power level operation, "L" level during cooking; "H" level otherwise. In other power level operation (50, 20 or 10%), "H" and "L" level is repeated according to power level.
<table>
<tr><th>P0WER LEVEL</th><th>ON</th><th>OFF</th></tr>
<tr><td>50%</td><td>26sec.</td><td>22sec.</td></tr>
<tr><td>20%</td><td>12sec.</td><td>36sec.</td></tr>
<tr><td>10%</td><td>8sec.</td><td>40sec.</td></tr>
</table>

</td></tr>
<tr><td>37-38</td><td>P23-P22</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>39-48</td><td>P21-P10</td><td>OUT</td><td><u>Segment data signal.</u>
The relation between signals and indicators are as follows:
Signal Segment Signal Segment
P01 ..... i P15 ..... f
P00 ..... j, k P14 ..... e
P21 ..... LB P13 ..... d
P20 ..... UB P12 c
P17 ..... h P11 ..... b
P16 ..... g P10 ..... a
 
</td></tr>
<tr><td>49-54</td><td>P07-P02</td><td>OUT</td><td><u>Digit selection signal.</u>
The relation between digit signal and digit are as follows:
Digit signal Digit
P07 ..... 1st.
P06 ..... 2nd.
P05 ..... 3rd.
P04 ..... 4th.
P03 ..... 5th.
P02 ..... 6th.
Normally, one pulse is output in every ß period, and input to the grid of the Fluo-rescent Display.
 
</td></tr>
<tr><td>55-56</td><td>P01-P00</td><td>OUT</td><td><u>Segment data signal.</u>
Signal similar to P21.</td></tr>
<tr><td>57-64</td><td>P37-P30</td><td>OUT</td><td>Terminal not used.</td></tr>
</table>

2-2 Memory IC (IC2) FOR R-24AT / R-22AT

AT24C04 is a 4K-bit, serial memory, enabling CMOS to be erased/written electrically. This memory is constructed with 512 registers x 8bits, enabling individual access, read and write operations to be performed. Details of input/output signal for IC2 are as shown in the following diagram.

TOP VIEW



FUNCTIONAL DIAGRAM

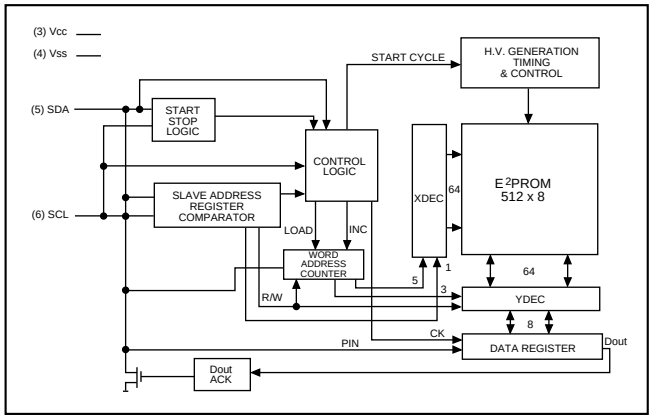


Figure T-2. Relation between Pin Nos, and Signals

Pin No.	Signal	I/O	Description
1-3	A0-A2	IN	Connected to GND.
4	VSS	IN	Connected to VC(-5V).
5	SDA	IN/OUT	Serial data input/output : input/outputs data to IC1.
6	SCL	IN	Clock signal input : input/outputs serial data at every one pulse.
7	TEST	IN	Connected to VC(-5V).
8	VCC	IN	Connected to GND.

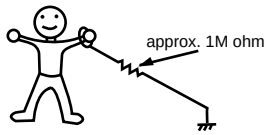
SERVICING

1. Precautions for Handling Electronic Components

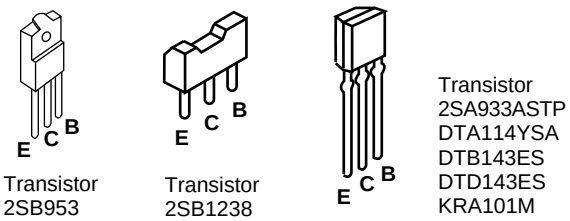
This unit uses CMOS LSI in the integral part of the circuits. When handling these parts, the following precautions should be strictly followed. CMOS LSI have extremely high impedance at its input and output terminals. For this reason, it is easily influenced by the surrounding high voltage power source, static electricity charge in clothes, etc, and sometimes it is not fully protected by the built-in protection circuit.

In order to protect CMOS LSI.

1) When storing and transporting, thoroughly wrap them in aluminium foil. Also wrap all PW boards containing them in aluminium foil.
2) When soldering, ground the technician as shown in the figure and use grounded soldering iron and work table.



2. Shapes of Electronic Components



Transistor 2SB953

Transistor 2SB1238

Transistor
2SA933ASTP
DTA114YSA
DTB143ES
DTD143ES
KRA101M

3. Servicing of Touch Control Panel

We describe the procedures to permit servicing of the touch control panel of the microwave oven and the precautions you must take when doing so. To perform the servicing, power to the touch control panel is available either from the power line of the oven itself or from an external power source.

(1) Servicing the touch control panel with power supply of the oven:

CAUTION: THE HIGH VOLTAGE TRANSFORMER OF THE MICROWAVE OVEN IS STILL LIVE DURING SERVICING PRESENTS A HAZARD.

Therefore, when checking the performance of the touch control panel, put the outer cabinet on the oven to avoid touching the high voltage transformer, or unplug the primary terminal (connector) of the high voltage transformer to turn it off; the end of such connector must be insulated with an insulating tape. After servicing, be sure to replace the leads to their original locations.

A. On some models, the power supply cord between the touch control panel and the oven itself is so short that the two can't be separated. For those models, check and repair all the controls (sensor-related ones included) of the touch control panel while keeping it connected to the oven.

B. On some models, the power supply cord between the touch control panel and the oven proper is long enough that they may be separated from each other. For those models, therefore, it is possible to check and repair the controls of the touch control panel while keeping it apart from the oven proper; in this case you must short both ends of the door sensing switch (on PWB) of the touch control panel with a jumper, which brings about an operational state that is equivalent to the oven door being closed. As for the sensor-related controls of the touch control panel, checking them is possible if dummy resistor(s) with resistance equal to that of the controls are used.

(2)Servicing the touch control panel with power supply from an external power source:

Disconnect the touch control panel completely from the oven proper,and short both ends of the door sensing switch (on PWB) of the touch control panel,which brings about an operational state that is equivalent to the oven door being closed. Connect an external power source to the power input terminal of the touch control panel, then it is possible to check and repair the controls of the touch control panel it is also possible to check the sensor-related controls of the touch control panel by using the dummy resistor(s).

4. Servicing Tools

Tools required to service the touch control panel assembly.

1) Soldering iron: 30W
   (It is recommended to use a soldering iron with a grounding terminal.)
2) Oscilloscope: Single beam, frequency range: DC-10MHz type or more advanced model.
3) Others: Hand tools

5. Other Precautions

1) Before turning on the power source of the control unit, remove the aluminium foil applied for preventing static electricity.
2) Connect the connector of the key unit to the control unit being sure that the lead wires are not twisted.
3) After aluminium foil is removed, be careful that abnormal voltage due to static electricity etc. is not applied to the input or output terminals.
4) Attach connectors, electrolytic capacitors, etc. to PWB, making sure that all connections are tight.
5) Be sure to use specified components where high precision is required.

PROCEDURE FOR CHECKING/CLEARING SERVICE COUNTS OF MICROWAVE OVEN FOR R-24AT / R-22AT

The following procedure enables the servicer to obtain the total service counts (cook cycles) for memory cooking, manual, repeat, double quantity cooking and defrost. The maximum capacity of the counter is 999,999 counts, above which the counter will reset to "0". The counter will retain the total counts (will not clear) in the event of a power disruption.

1) Practice for checking total service counts
(eg; 234,567 Counts).

▒ --- flashing / ○ ---0.1sec. BUZZER

PAD	DISPLAY	INDICATOR	LED	PHONE
(door close)	•			
	•			
CHECK	NUMBER •	CHECK		○
CHECK	#1 82 68 (user total count)	CHECK		○
#2 VOLUME VOLUME DOUBLE QUANTITY	↓ 2 34 56 7 (service total count)			○
1	↓ NUMBER 1			○
	↓ (after 1 sec.)			
	45 (filter used time)			
2	NUMBER 2 ↓ (after 1 sec.)			○
	2 00 (filter lim. time)			
0 (No 10)	NUMBER 10 ↓ (after 1 sec.)			○
	35 43 2 (service total cook time)	↓		
CHECK	•			○

#1: Denotes total service counts within the reach of user, of which checking and clearing practices are described in this instruction manual.
#2: Denotes the procedure for the servicer to disable checking/clearing. This procedure is instructed to service personnel only and is excluded from the operation manual.

2) Practice for clearing Service's counts

" " : Flicker / ○: 0.1 sec BUZZER

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
CHECK	"NUMBER" • CHECK	○
CHECK	82 68 "CHECK" (User's Total Counts)	○
#1 VOLUME	82 68 "CHECK"	
VOLUME	82 68 "CHECK"	
DOUBLE QUANTITY	2 34 56 7 "CHECK" (Total Counts Service)	○
SET	0 "CHECK"	○
0	0 "CHECK"	○
SET	0 "CHECK"	○
CHECK	•	○

#1: Denotes the procedure for the servicer to disable clearing. This procedure is instructed to service personnel only and is excluded from the operation manual.

PROCEDURE FOR ENTERING TO IC-2 FOR R-24AT / R-22AT

When the control unit or IC-2 is exchanged, re-enter the constans of EXPRESS DEFROST, the memory information and the EEPROM data, referring to the following procedures. If not so, the oven will not operate correctly.

1) How to enter the constants of EXPRESS DEFROST.

Constants of EXPRESS DEFROST.

T = STG1 + STG2 + STG3
STG = A X T + B
STG1= 0.20 X T + 20 Power level 50%
STG2= 0.13 X T + 30 Power level 30%
STG3= 0.67 X T - 50 Power level 20%

" " : Flicker / ○: 0.1 sec BUZZER

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
SET	•	
SET (within 2 sec.)	"NUMBER" •	○
#1 START	"NUMBER" •	
EXPRESS DEFROST	1 0.00 DEF	○
2, 0	1 0.20 DEF (A)	○ x 2
MANUAL/ REPEAT	1 0 DEF	○
2	1 0.20 DEF #2 (+ - B)	○
POWER SETTING	1 DEF 20 "POWER" 100%	○
5	1 DEF 20 POWER 50%	○
MANUAL/ REPEAT	2 0.00 DEF	○
1, 3	2 0.13 DEF (A)	○ x 2
MANUAL/ REPEAT	2 0 DEF	○
3	2 30 DEF (+ - B)	○
POWER SETTING	2 DEF 30 "POWER" 100%	○
3	2 DEF 30 POWER 30%	○
MANUAL/ REPEAT	3 0 DEF	○
#3 5	3 5 DEF "CHECK"	○
POWER SETTING	3 DEF 5 "POWER" 100%	○
2	3 DEF 5 POWER 20%	○
SET	4 • DEF	○
SET	•	○

#1: No key entry signal.
#2: To set -B, touch the POWER SETTING key twice.
#3: Ex. "CHECK" will flash and the oven will beep after 50% of EXPRESS DEFROST time has lapsed when 5 key is entered.

2) How to enter the memory information

Example: Suppose cooking time 5 sec. and output power 100% are entered into the memory pad 1.

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
SET	•	
SET (within 2 sec.)	"NUMBER" •	○
1	NUMBER 1 • 0	○
5	NUMBER 1 • 5	○
SET	"NUMBER" •	○
SET	•	○

Enter the memory information into the memory pads 1 ~10 referring to above example. The memory information are given below.

Memory No.	Cook Time	Output Power
1	5 sec.	100%
2	10 sec.	100%
3	20 sec.	100%
4	30 sec.	100%
5	40 sec.	100%
6	50 sec.	100%
7	1 min.	100%
8	1 min. 15 sec.	100%
9	1 min. 30 sec.	100%
10	2 min.	100%
11-20	0 sec.	

3) How to enter the EEPROM pad.

Enter the EEPROM data into the memory pads, 3, 4,6, 8, 9, 11, 12, 13, 14, 15 and 20, referring to following example and the table of EEPROM data.

Example: Suppose the EEPROM dada "2235" is entered in to the memory pad 3.

" " : Flicker / : 0.1 sec BUZZER

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
CHECK	"NUMBER" • CHECK	○
CHECK	#2 8268 "CHECK" (User"s Total Counts)	○
#1 VOLUME	#2 8268 "CHECK"	
VOLUME	#2 8268 "CHECK"	
DOUBLE QUANTITY	#3 xxxxxx "CHECK" (Total Counts of Service)	○
3	3030 "CHECK"	○
SET	0 "CHECK"	○
2, 2, 3, 5	2235 "CHECK"	○ x4
SET	2235 "CHECK"	○
CHECK	•	○

#1: Denotes the procedure for the servicer to disable clearing. This procedure is instructed to service personnel only and is excluded from the operation manual.
#2: If the IC-2 is exchanged, 0 should be indicated instead of 8268. But if the control unit is exchanged, 0 is not always indicated.
#3: Total counts of Service, 6 figures will be displayed.

Table of EEPROM data

Memory pad	Data	Contents
3	2 2 3 5	Hiher temperature limit setting of magnetron thermistor detection.
4	0 0 0 0	Constant setting of fan lock detection.
6	0 1 0 0	Time setting of fan lock detection.
8	3 2 0 0	Hiher temperature limit setting of exhaust air detection.
9	0 0 0 0	Constant setting of fan lock detection.
11	0 0 0 0	Constant setting of magnetron thermistor detection.
12	0 0 0 0	Constant setting of magnetron thermistor detection.
13	0 0 0 0	Constant setting of magnetron thermistor detection.
14	0 0 0 0	Constant setting of magnetron thermistor detection.
15	1 5	Interval time setting of magnetron thermistor detection.
20	0 0 0 0	Switching level setting of magnetron thermistor detection.

OTHER CHECKING AND CLEARING PROCEDURE FOR R-24AT / R-22AT

1) To check the contents of defrost.

" " : Flicker / ○ : 0.1 sec BUZZER

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
CHECK	"NUMBER" • CHECK	○
DEFROST	1 0.20 DEF CHECK (A)	○
	DEF CHECK 1 20 POWER (+ - B) 50%	
	2 0.13 DEF CHECK (A)	
	DEF CHECK 2 30 POWER (+ - B) 30%	
	DEF CHECK 3 5 POWER 20%	
	(Repeat)	
CHECK	•	○

#1 : No key entry signal.

2) How to clear all counter(user and service) and total cooking time and used time of filter.

PAD ORDER	DISPLAY	PHONE
(Door close)	•	
SET	•	
SET	"NUMBER" •	○
DOUBLE	"NUMBER" • DOUBLE	○
CHECK	"NUMBER" • DOUBLE	
VOLUME	"NUMBER" • DOUBLE	
SET	•	○

COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE

WARNING: Avoid possible exposure to microwave energy. Please follow the instructions below before operating the oven.

1. Disconnect the oven from power supply.
2. Make sure that a definite "click" can be heard when the microwave oven door is unlatched. (Hold the door in a closed position with one hand, then push the door open button with the other, this causes the latch leads to rise, it is then possible to hear a "click" as the door switches operate.)
3. Visually check the door and cavity face plate for damage (dents, cracks, signs of arcing etc.).

Carry out any remedial work that is necessary before operating the oven.
Do not operate the oven if any of the following conditions exist;

1. Door does not close firmly.
2. Door hinge, support or latch hook is damaged.
3. The door gasket or seal is damaged.
4. The door is bent or warped.
5. There are defective parts in the door interlock system.
6. There are defective parts in the microwave generating and transmission assembly.
7. There is visible damage to the oven.

Do not operate the oven:
1. Without the RF gasket (Magnetron).
2. If the wave guide or oven cavity are not intact.
3. If the door is not closed.
4. If the outer case (cabinet) is not fitted.

Please refer to 'OVEN PARTS, CABINET PARTS, CONTROL PANEL PARTS, DOOR PARTS', when carrying out any of the following removal procedures:

WARNING FOR WIRING

To prevent an electric shock, take the following precautions.
1. Before wiring,
   1) Disconnect the power supply cord.
   2) Open the door and block it open.
   3) Discharge the two high voltage capacitors and wait for 60 seconds.
2. Don't let the wire leads touch to the followiong parts;
   1) High voltage parts:
      Magnetron, High voltage transformer, High voltage capacitor, High voltage rectifier assembly and High voltage wire.
   2) Hot parts:
      Oven lamp, Magnetron, High voltage transformer, and Oven cavity.
   3) Sharp edge:
      Bottom plate, Oven cavity, Waveguide flange, Chassis support and other metallic plate.
   4) Movable parts (to prevent a fault)
      Blower fan blade, Blower fan motor, Switches, Switch levers, Antenna motors and Sirrer antennas.
3. Do not catch the wire leads in the outer case cabinet.
4. Insert the positive lock connector until its pin is locked and make sure that the wire leads do not come off even if the wire leads are pulled.
5. To prevent an error function, connect the wire leads correctly, referring to the Pictorial Diagram.

OUTER CASE, REAR CABINET AND POWER SUPPLY CORD REMOVAL

To remove the components, procedure as follows.
1. Disconnect oven from power supply.
2. Open the oven door and wedge it open.
3. Remove the screws from the rear and along side the edge of the outer case.
4. Slide the case back about 1 inch (3 cm) to free it from the oven cavity.
5. Lift entire case from the unit.
6. **DISCHARGE TWO HIGH VOLTAGE CAPACITORS BEFORE TOUCHING ANY OVEN COMPONENTS OR WIRING.**
7. Now, outer case is free.

N.B.; Step 1,2 and 9 form the basis of the 3D checks.

CAUTION: DISCHARGE TWO HIGH VOLTAGE CAPACITORS BEFORE TOUCHING ANY OVEN COMPONENTS OR WIRING.

To remove rear cabinet and power supply cord:
8. Remove the screws holding the rear cabinet to the oven cavity and blower motor.
9. Remove the one (1) screws holding the switch mounting angle to the rear cabinet and release the switch mounting angle from the rear cabinet.
10. Disconnect the power supply cord from the fuse holder.
11. Remove the one (1) screws holding the grounding wire of power supply cord to the oven cavity.
12. Remove the rear cabinet with the power supply cord from the oven cavity.
13. Loosen the tab of the cord bushing, and remove the power supply cord with the cord bushing from the rear cabinet.
14. Remove the cord bushing from the power supply cord,
15. Now, the power supply cord and rear cabinet are free.

HIGH VOLTAGE TRANSFORMER(S) REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Disconnect wire lead(s) of high voltage transformer(s) from magnetron(s).

4. Remove the wire lead(s) of high voltage transformer(s) from the wire holder.
5. Pull out the wire lead(s) of high voltage transformer(s) from the tube.
6. Disconnect wire lead(s) of high voltage transformer(s) from high voltage capacitor(s).
7. Disconnect the high voltage fuse(s) from high voltage transformer(s).
8. Disconnect the main wire harness from high voltage transformer(s).
9. Remove two (2) screws holding each power transformer to base plate.
10. Remove the high voltage transformer(s) from base plate.
12. Now, high voltage transformer(s) are free.

MAGNETRON(S) REMOVAL

Removal

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Remove the two (2) screws holding magnetron exhaust duct to upper and lower waveguide.
4. Remove the magnetron exhaust duct from oven cavity.
5. Disconnect wire leads from magnetron(s).
6. Disconnect magnetron thermistor from the connector of the stop switch harness.
7. Remove the one (1) screw holding the thermistor angle to the upper magnetron.
8. Remove the four (4) screws holding each magnetron to upper and/or lower waveguide. When removing the screws, hold the magnetron to prevent it from falling.
9. Remove the magnetron(s) from upper and/or lower waveguide with care so magnetron antenna is not hit by any metal object around antenna.
10. Pull out the thermistor angle from the upper magnetron.
11. Now, the magnetron(s) is (are) free.

CAUTION: WHEN REPLACING MAGNETRON, BE SURE THE R.F. GASKET IS IN PLACE AND MOUNTING SCREWS ARE TIGHTENED SECURELY.

MAGNETRON THERMISTOR REPLACEMENT

Removal

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Remove the upper magnetron from the upper waveguide flange, referring to "MAGNETRON(S) REMOVAL".
4. Now, the upper magnetron with the magnetron thermistor should be free.
5. Remove the thermistor angle from the upper magnetron by pulling out.
6. Straighten the tab of the magnetron thermistor angle holding the magnetron thermistor.
7. Remove the magnetron thermistor from the thermistor angle.
8. Now, the magnetron thermistor is free.

Re-install

1. Install the magnetron thermistor to the thermistor angle as shown in Figure C-1.

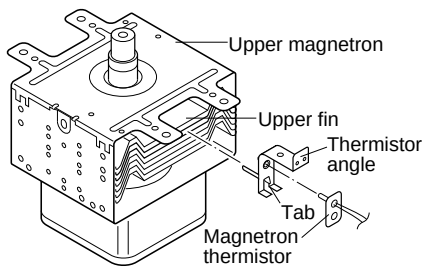


Figure C-1. Magnetron thermistor installation

2. Hold the magnetron thermistor to the thermistor angle by bending the tab of the thermistor angle.
3. Insert the thermistor angle between the 2nd. fin and 3rd. fin from the upper fin of the upper magnetron and push it until the thermistor angle stops.

NOTE: The magnetron thermistor should be between the upper fin and the 2nd. fin.

4. Re-install the upper magnetron to the upper waveguide flange with four (4) screws.
5. Re-install the thermistor angle to the upper waveguide flange with one (1) screw.
6. Re-install the magnetron exhaust duct to the upper and lower waveguide flanges with two (2) screws.
7. Route the thermistor harness under the magnetron temperature fuse.
8. Connect the thermistor harness to the stop switch harness.
9. Connect the wire leads to the upper magnetron, referring to the pictorial diagram.
10. Re-install the power supply cord, rear cabinet and outer case cabinet to the oven by reversing the procedures of "OUTER CASE, REAR CABINET AND POWER SUPPLY CORD REMOVAL".

HIGH VOLTAGE CAPACITOR, HIGH VOLTAGE FUSE AND HIGH VOLTAGE RECTIFIER ASSEMBLY REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Remove two (2) screws holding earth side terminals of high voltage rectifier assembly to the capacitor holder and oven cavity.
4. Disconnect all wire leads from the high voltage capacitor.
5. Disconnect high voltage fuse(s) from the high voltage transformer(s). Now, high voltage fuse(s) is(are) free.
6. Remove the three (3) screws holding the blower motor to the top of oven cavity, the chassis support and air duct.
7. Disconnect high voltage wire lead(s) of the high voltage rectifier assembly from the magnetron(s).

Now, the the high voltage rectifier assembly is free.

8. Remove two (2) screws holding the capacitor holder to oven cavity.
   Now, the capacitors are free.

CAUTION:

1. DISCHARGE THE TWO HIGH VOLTAGE CAPACITORS BEFORE TOUCHING ANY OVEN COMPONENTS OR WIRING.
2. DO NOT REPLACE ONLY THE HIGH VOLTAGE RECTIFIER. IF IT IS DEFECTIVE, REPLACE THE HIGH VOLTAGE RECTIFIER ASSEMBLY.
3. WHEN REPLACING THE HIGH VOLTAGE RECTIFIER ASSEMBLY AND THE HIGH VOLTAGE CAPACITOR, THE CATHODE (EARTH) SIDE TERMINAL OF THE HIGH VOLTAGE RECTIFIER MUST BE SECURED FIRMLY WITH A EARTHING SCREW.

BLOWER MOTOR AND BLOWER MOTOR TEMPERATURE FUSE REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the rear cabinet, too.
3. Disconnect the wire leads from the blower motor and blower motor temperature fuse.
4. Remove the one (1) screw holding the blower motor to the oven cavity.
5. Remove the one (1) screw holding the blower motor to the chassis support.
6. Remove the one (1) screw holding the air duct to the blower motor.
7. Remove the blower motor from the oven cavity.
8. Remove the two (2) screws holding the blower motor temperature fuse to the blower motor.
9. Now, the blower motor and blower motor temperature fuse are free.

STIRRER MOTORS (UPPER AND LOWER) REMOVAL

UPPER

1. CARRY OUT 3D CHECKS.
2. Disconnect the wire leads from the stirrer motor (upper).
3. Remove the one (1) screw holding the stirrer motor (upper) to the oven cavity.
4. Turn and lift up the stirrer motor (upper).
5. Now, the stirrer motor (upper) is free.

LOWER

1. Disconnect oven from the power supply.
2. Remove the stirrer motor cover by snipping off the material in four portions.
3. Where the portions have been snipped off bend the portions flat. No sharp edge must be evident after removal of the stirrer motor cover.
4. Disconnect the wire leads from the stirrer motor (lower).
5. Remove the one (1) screw holding the stirrer motor (Lower) to the oven cavity.
6. Now, the stirrer motor (lower) is free.
7. After replacement use one (1) screw to fit the stirrer motor cover. (This screw has been fitted to the base plate near the stirrer motor cover beforehand.)

HOW TO RELEASE THE POSITIVE LOCK® CONNECTOR.

Procedure

1. CARRY OUT 3D CHECKS.
2. Pushing the lever of positive lock® connector, pull down the connector from the terminal.
3. Now, the connector is free.

CAUTION: WHEN CONNECTING THE POSITIVE LOCK® CONNECTORS TO THE TERMINALS, CONNECT THE POSITIVE LOCK® CONNECTOR SO THAT THE LEVER FACES YOU.

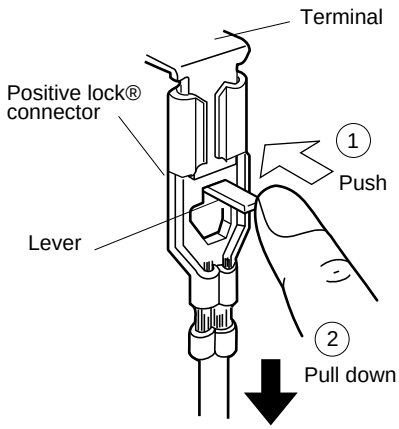


Figure C-2. How to release the positive lock connector.

OVEN LAMP AND LAMP SOCKET REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the oven lamp.
3. Pull the wire leads from the oven lamp socket by pushing the terminal hole of the oven lamp socket with the small flat type screw driver.
4. Lift up the oven lamp socket .
5. Now, the oven lamp socket is free.

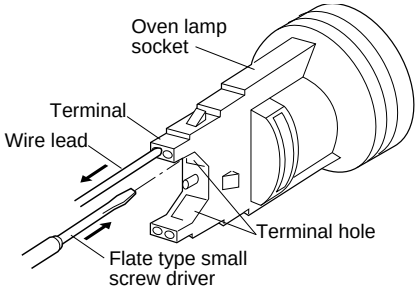
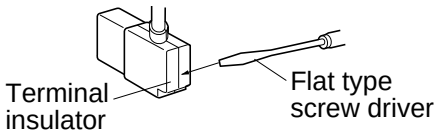


Figure C-3. Oven lamp socket

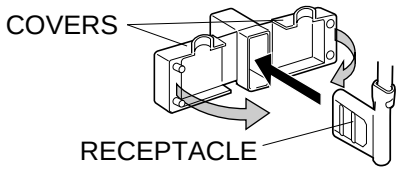
TERMINAL INSULATOR REPLACEMENT

1. Open covers of the terminal insulator by using small flat type screw driver.
2. Remove the receptacle from the terminal insulator.
3. Now, the terminal insulator is free.



Installation

1. Insert the receptacle into terminal insulator.
2. Close covers of the terminal insulator, as shown illustlated below.



CONTROL PANEL ASSEMBLY AND CONTROL UNIT REMOVAL

CONTROL PANEL ASSEMBLY REMOVAL

The complete control panel should be removed for replacement of components. To remove the control panel, proceed as follows:

1. CARRY OUT 3D CHECKS.
2. Remove the air intake filter assembly from the base plate.
3. Remove two (2) screws holding the control panel to the base plate.
4. Pull down the control panel and remove it forward.
5. Disconnect two connectors (A), (B), (H) and TAB terminal (TAB1,2,3,4) from the control unit.
6. Now the control panel assembly is free.

CAUTION FOR TOUCH CONTROL PANEL REMOVAL

1) Hold the lower end (Position A, Fig. 1) of the touch control panel assembly firmly while sliding it down and toward you.

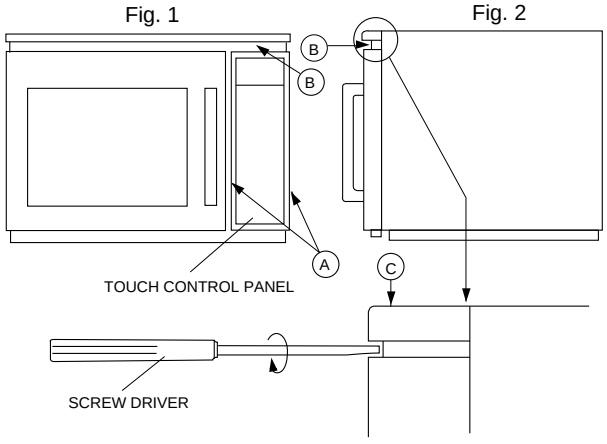
   DO NOT FORCE THE CONTROL UNIT TO SLIDE DOWN DURING REMOVAL. THIS MAY CAUSE DAMAGE TO THE CONTROL UNIT BY HITTING A RELAY (RY-4 for R-22AT/24AT ; RY-3 for R-23AM) OR THE TAB TERMINALS LOCATED AT THE FRONT OF THE OVEN CAVITY.

2) If the Touch Control Panel is hard to remove;
(1) Insert a flat head screw driver into space B . (Fig. 1)
(2) Rotate the screwdriver clockwise while holding position C of the Touch Control Panel. (Fig. 2)

   TO AVOID DAMAGE TO TOUCH CONTROL PANEL, COVER THE TIP OF SCREWDRIVER WITH TAPE.

(3) If the relay (RY-4 for R-22AT/24AT ; RY-3 for R-23AM) is hit, re-solder the Relay (RY-4) prior to reinstalling the Touch Control Panel.

Fig. 1 Fig. 2



Replacement of individual component is as follows:

for R-23AM

CONTROL UNIT AND CONTROL PANEL FRAME (WITH SWITCH UNIT)

7. Remove two (2) screws holding the control panel mounting angle to the panel frame.
8. Lift up the control panel mounting angle from the panel frame.
9. Disconnect the connectors (J) and (E) from the control unit.
10. Remove six (6) screws holding the control unit to the panel frame assembly.
11. Push down the right side two (2) hooks fixing the control unit to the panel frame assembly, and lift up the control unit upward.
12. Now, the control unit and control panel frame (with switch unit) are free.

CAUTION:
At installing control panel unit assembly to main body set:

1. **Ensure the installation of wiring-related parts without negligence.**
2. **When inserting wire cable to main body set, ensure them free from caught-in trouble. In addition, when installing the control panel assembly to base plate with screws, be sure of pushing the control panel unit upward to fix with screws firmly.**
3. **Do not allow any wire leads to come near the varistor works, because it will explode and the wire leads near by the varistor will be damaged.**

SWITCH UNIT

13. Remove the three (3) screws holding the switch unit (Main) to the control panel frame.
14. Remove the two (2) screws holding the switch unit (Sub.) to the control panel frame.
15. Now, the switch unit is free

ROTARY ENCODER

13. Remove the one (1) screw holding the earth wire to the rotary encoder.
14. Remove the two (2) screws and one (1) washer holding the rotary encoder to the control panel frame.
15. Remove the knob from the rotary encoder shaft.
16. Now, the rotary encoder is free.

for R-22AT and R-24AT

CONTROL UNIT AND CONTROL PANEL FRAME (WITH KEY)

7. Remove three (3) screws holding the control panel mounting angle to the panel frame.
8. Lift up the control panel mounting angle from the panel frame.
9. Disconnect connector (G) from the control unit by pushing the hooks of cable holder inwardly.
10. Remove six (6) screws holding the control unit to the panel frame assembly.
11. Push down the right side two (2) hooks fixing the control unit to the panel frame assembly, and lift up the control unit upward.
12. Now, the control unit and control panel frame (with key) are free.

CAUTION:
At installing control panel unit assembly to main body set:

1. **Ensure the installation of wiring-related parts without negligence.**
2. **When inserting key cable to main body set, ensure them free from caught-in trouble. In addition, when installing the control panel assembly to base plate with screws, be sure of pushing the control panel unit upward to fix with screws firmly.**
3. **Do not allow any wire leads to come near the varistor works, because it will explode and the wire leads near by the varistor will be damaged.**

NOTE: 1. Before attaching a new key unit, remove remaining adhesive on the control panel frame surfaces completely with a soft cloth soaked in alcohol.

2. When attaching the key unit to the control panel frame, adjust the upper edge and right edge of the key unit to the correct position of control panel frame.
3. Stick the key unit firmly to the control panel frame by rubbing with soft cloth to prevent scratching.

POWER SUPPLY CORD REPLACEMENT

1. CARRY OUT 3D CHECKS
2. Release the cord bushing from the rear cabinet.
3. Disconnect the brown and blue wires of the power supply cord from the noise filter.
4. Remove the single (1) screw holding the earth wire of power supply cord.
5. Remove the power supply cord.

Re-install

1. Insert the power supply cord into the cord bushing.
2. Connect the brown and blue wires of power supply cord into the terminals of noise filter, referring to pictorial diagram.
3. Install the green/yellow wire of power supply cord with the one (1) screw.
4. Re-install the cord bushing to the rear cabinet.
5. CARRY OUT 4R CHECKS.

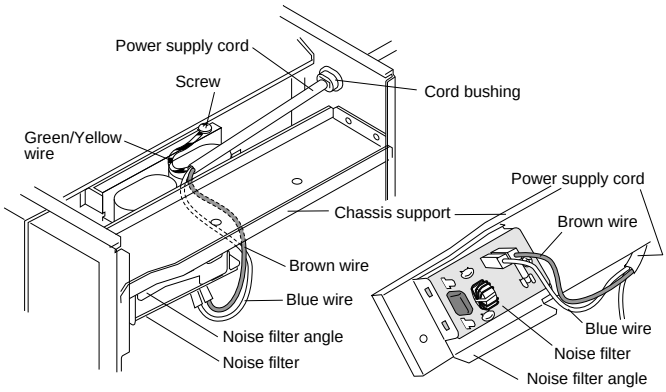


Figure C-4. Power supply cord replacement

1ST LATCH, 2ND LATCH, 3RD LATCH, MONITOR, AND STOP SWITCHES REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the control panel from the oven cavity referring to "CONTROL PANEL REMOVAL".
3. Remove the two (2) screws holding the latch hook to the oven cavity.
4. Open the door and pull the latch hook out of the oven cavity.
5. For 3rd. latch, stop or Monitor switch removal
   5-1. Disconnect the wire leads from the switch.
   5-2. Push the retaining tabs outward slightly and then pull the switch forwards and remove it from the latch hook.
6. For 1st. latch and 2nd. latch switches removal
   6-1. Disconnect the wire leads from the 1st latch and 2nd. latch switches.
   6-2. Remove the single (1) screw and nut holding the 1st latch and 2nd. latch switches to the latch hook.

CAUTION: IF THE LATCH HOOK IS NEW, WHEN THE 1ST LATCH SWITCH AND 2ND. LATCH SWITCH ARE INSTALLED, THE TWO (2) TABS OF THE LATCH HOOK SHOULD BE BROKEN.

1ST, 2ND, 3RD LATCH SWITCH, STOP SWITCH AND MONITOR SWITCH ADJUSTMENT

In case 1st latch switch, 2nd latch, stop switch, 3rd latch switch and monitor switch do not operate properly due to a mis-adjustment, the following adjustment should be made.

1. Loosen the two (2) screws holding the latch hook.
2. With the door closed, adjust the latch hook by moving it back and forward, or up and down. In and out play of the door allowed by the latch hook should be less than 0.5mm. The vertical position of the latch hook should be placed where the stop switch and 1st, 2nd, 3rd latch switches have activated with the door closed.
   The horizontal position of the latch hook should be placed where the monitor switch has activated with the door closed.
3. Secure the screws with washers firmly.
4. Make sure of the 1st, 2nd, 3rd latch switches, stop switch, and monitor switch operation. If those switches have not activated with the door closed, loose two (2) screws holding latch hook and adjust the latch hook position.

After adjustment, make sure of the following:

1. In and out play of door remains less than 0.5mm when in the latched position.
2. The stop switch and 1st, 2nd, 3rd latch switches interrupt the circuit before the door open when the door release lever is pulled, and then and monitor switch close the circuit when the door is opened.
3. Re-install outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

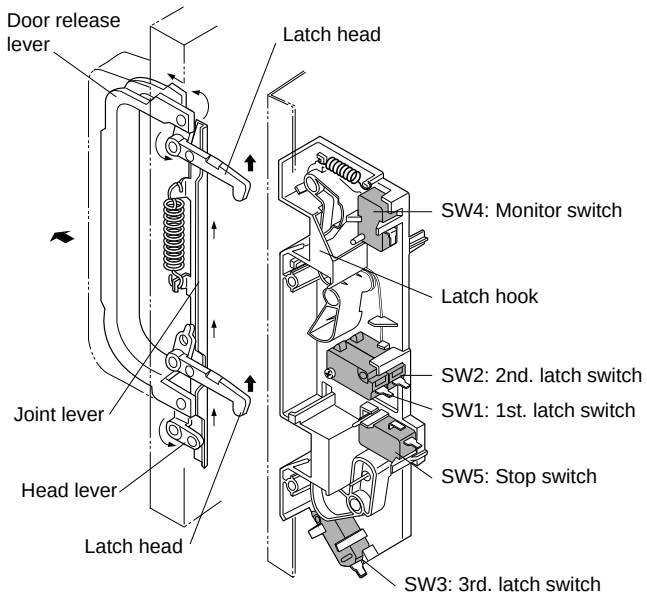


Figure C-5 Latch Switch Adjustments

DOOR REPLACEMENT AND ADJUSTMENT

REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the two (2) screws holding each of the upper and lower oven hinges to the oven cavity.
3. Remove door assembly with upper and lower oven hinges by pulling it forward.
4. Release upper and lower oven hinges from door assembly.
5. Now, door assembly is free.

NOTE: When individual parts are replaced, refer to "Door Disassembly".

RE-INSTALL

1. Insert the upper and lower oven hinges into door hinge pins.
2. Insert the upper and lower oven hinges with door assembly into rectangular holes of oven cavity front plate.
3. Make sure that the door is parallel with oven face lines (left and upper side line) and door latch heads pass through the latch holes correctly.
4. Fasten upper and lower oven hinges firmly to oven cavity with two (2) screws on each hinge.

Note: After any service to the door;

(A) Make sure that 1st. latch switch, 2nd. latch switch, 3rd. latch switch, stop switch and monitor switch are operating properly. (Refer to chapter "Test Procedures".).

(B) An approved microwave survey meter should be used to assure compliance with proper microwave radiation emission limitation standards.

DOOR ADJUSTMENT

When removing and/or loosening hinges such as in door replacement, the following adjustment criteria are taken. Door adjustment is performed with the door properly installed and closed and while the oven hinges are loose.

1. Loosen upper and lower oven hinges with phillips head screw driver.
2. Adjust the door by moving it vertically so that the top right hand corner of the door is in line with the top of the control panel frame assembly.
3. Tighten the upper and lower oven hinge screws.

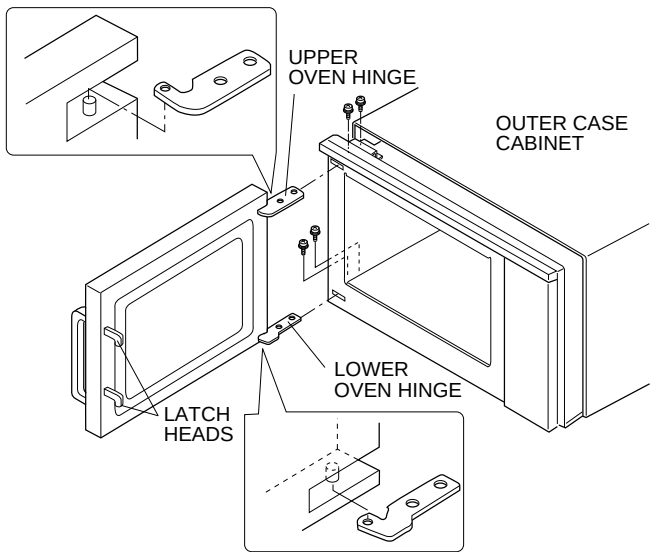


Figure C-6. Door Replacement

After adjustment, make sure of the following:

1. Door latch heads smoothly catch the latch hook through the latch holes, and the latch head goes through the center of the latch hole.
2. Deviation of the door alignment from horizontal line of cavity face plate is to be less than 1.0mm.
3. The door is positioned with its face depressed toward the cavity face plate.
4. Re-install outer case and check for microwave leakage

around door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

Note: The door on a microwave oven is designed to act as an electronic seal preventing the leakage of microwave energy from oven cavity during cook cycle. This function does not require that door be air-tight, moisture (condensation)-tight or light-tight. Therefore, occasional appearance of moisture, light or sensing of gentle warm air movement around oven door is not abnormal and do not of themselves, indicate a leakage of microwave energy from oven cavity. If such were the case, your oven could not be equipped with a vent, the very purpose of which is to exhaust the vapor-laden air from the oven cavity.

DOOR DISASSEMBLY

CHOKE COVER REMOVAL

1. Open the door and insert a putty knife (thickness of about 0.5mm) in gap between the choke cover and corner portion of door panel to free engaging parts. Refer to Fig. C-7.

NOTE: As the choke cover and door panel are engage at 16 places, do not force any perticular part.

2. Remove the choke cover carefully. (If choke cover is broken, replace with a new one.)

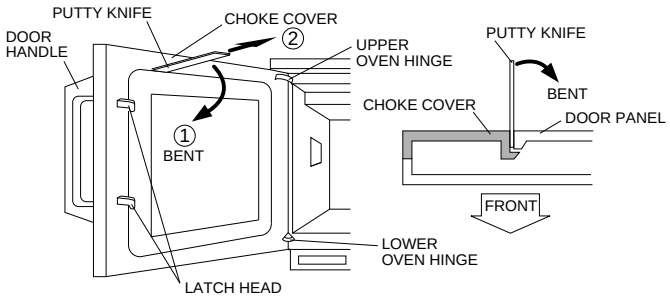


Figure C-7. Choke cover

DOOR COMPONENTS REMOVAL

UPPER AND LOWER OVEN HINGES REMOVAL

1. Remove the door assembly from oven cavity, referring to "REMOVAL" of "DOOR REPLACEMENT AND ADJUSTMENT".
2. Remove choke cover, referring to "CHOKE COVER REMOVAL".
3. Release the oven hinges from the door panel.
4. Now, the oven hinges are free.

DOOR HANDLE REMOVAL

1. Remove the door assembly from oven cavity, "REMOVAL" of "DOOR REPLACEMENT AND ADJUSTMENT".
2. Place door assembly on a soft cloth with latches facing up.
3. Remove choke cover from door panel, referring to "CHOKE COVER REMOVAL".
4. Remove two (2) screws holding the door handle to door.
5. Remove the door handle from door panel.
6. Now, door handle is free.

UPPER AND LOWER LATCH HEADS REMOVAL

7. Remove the door release lever from the door assembly.
8. Remove the three (3) screws holding the joint plate to the door panel.
9. Release the latch spring from the tab of the joint lever and joint plate.
10. Release the latch heads from joint lever and joint plate.
11. Now, the latch heads are free.

DOOR CASE REMOVAL

1. Remove the door assembly from oven cavity, referring to "REMOVAL" of "DOOR REPLACEMENT AND ADJUSTMENT".
2. Remove choke cover from door panel, referring to "CHOKE COVER REMOVAL".
3. Remove door handle from door panel, referring to "DOOR HANDLE REMOVAL".
4. Bend up four (4) nails of door case.
5. Remove door case from door panel.
6. Now, the door case is free.

DOOR GLASS REMOVAL

7. Remove the four (4) screws holding two (2) outside window fixing plates to door panel.
8. Now, the door glass is free.

SERVICE INFORMATION

IMPORTANT: When the magnetron MG1 and/or MG2 is replacing, the relays (RY3 and RY4 for R-22AT/24AT; RY2 and RY3 for R-23AM) on control unit must be replaced at the same time. Because if the magnetron's life has been over, the relay's life may also be over.

MICROWAVE MEASUREMENT

After any repair, the microwave oven must be checked for microwave leakage to ensure continued safe operation. BS EN 60335-2-25 specifies that the maximum permitted leakage with a load of 275 ml is 50 W/m^2 (equivalent to 5 mW/cm^2) at a distance of 5 cm from the oven.

PREPARATION

The following items are required to carry out this test:-

1. A low form of 600 ml beaker made from an electrically non-conductive material, such as glass or plastic, with an inside diameter of approximately 8.5 cm. This must contain 275 ± 15 ml of water, at an initial temperature of 20 ± 2˚C.
2. A leakage detector which has been calibrated within the preceding 12 months to a stand whose accuracy can be traced to National Physical Laboratory Standards.

   Recommended instruments are:

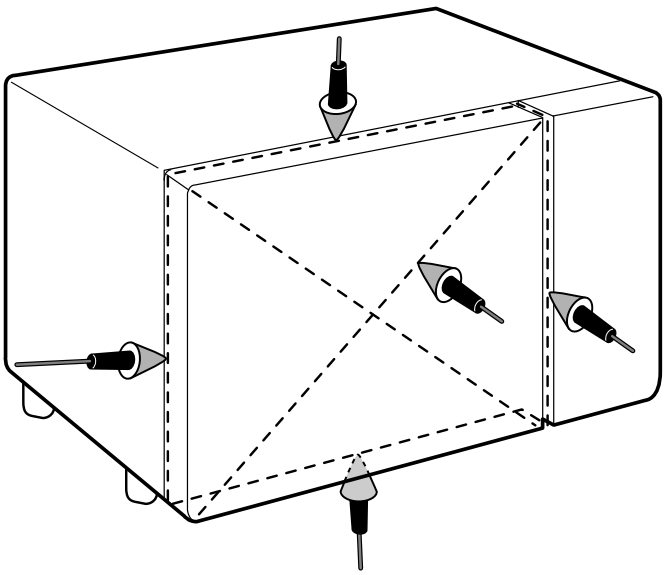
   Apollo “XI”
   Celtec “A100”

Before commencing the test, check that the leakage detector is functioning and adjusted according to the manufacturer’s instructions, and any spacers are fitted to ensure that measurement is taken 5cm from the surface of the oven.

PROCEDURE

1. Place the beaker containing the water load in the oven cavity at the centre of the turntable. The placing of this standard load in the oven is important, not only to protect the oven, but also to ensure that any leakage it is not disguised by too large a load absorbing energy.
2. Close the oven door, and with the power level set to FULL, turn the oven ON with the timer set for a few minutes operation. Should the water begin to boil before the test has been completed, it should be replaced.
3. As shown in the diagram below, move the probe slowly (not faster than 2.5 cm/sec.);-

a) around the edge of the door following the gap
b) across the face of the door
c) across any vents in the oven’s sides, rear or top



Dotted line indicates the path taken by the leakage detector.

Whilst the maximum leakage permitted in BS EN 60335-2-25 is 50 W/m^2 (equivalent to 5 mW/cm^2), it is not normal to detect any significant leakage, and therefore any detected leakage should be investigated.

SCHEMATIC
NOTE: CONDITION OF OVEN
1. POWER SUPPLY CONNECTED AND/OR 1MINUTE AFTER DOOR CLOSED OR COOK OFF.
2. [:] APPEAR ON DISPLAY.

NOTE: ★Indicates components with potential above 250 V.

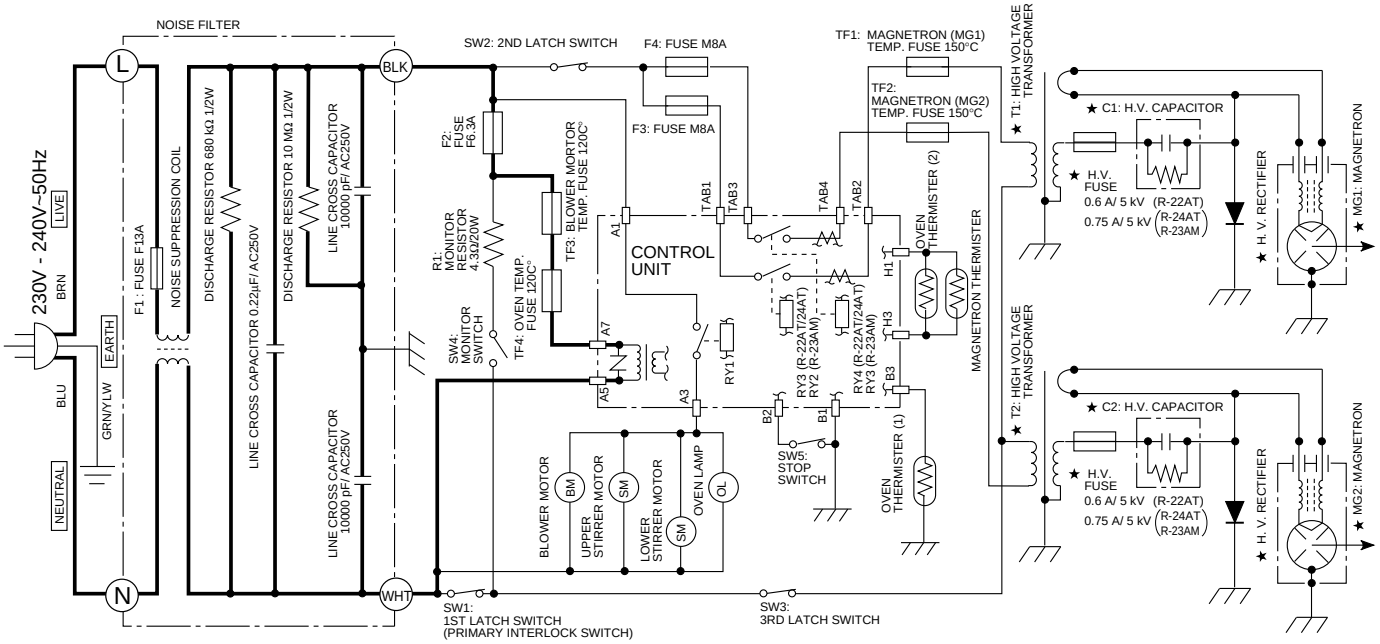


Figure O-1 Oven Schematic-OFF Condition

SCHEMATIC
NOTE: CONDITION OF OVEN
1. FOR 1MINUTE AFTER DOOR CLOSED.
2. [:] APPEAR ON DISPLAY.

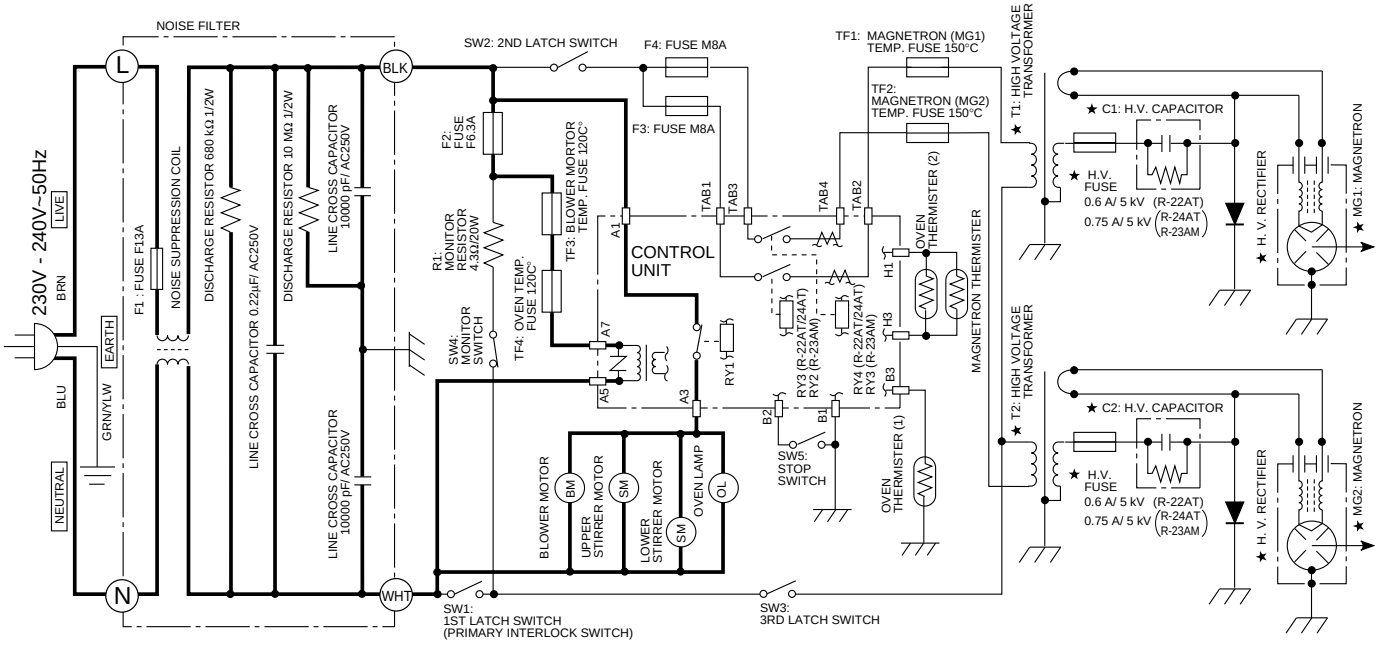


Figure O-2 Oven Schematic-IDLE Condition (Door opened condition)

SCHEMATIC
NOTE: CONDITION OF OVEN
1. DOOR CLOSED.
2. MANUAL/ REPEAT KEY TOUCHED [R-22AT/24AT].
3. COOKING TIME PROGREMMED.
4. START PAD TOUCHED.

NOTE: ★Indicates components with potential above 250 V.

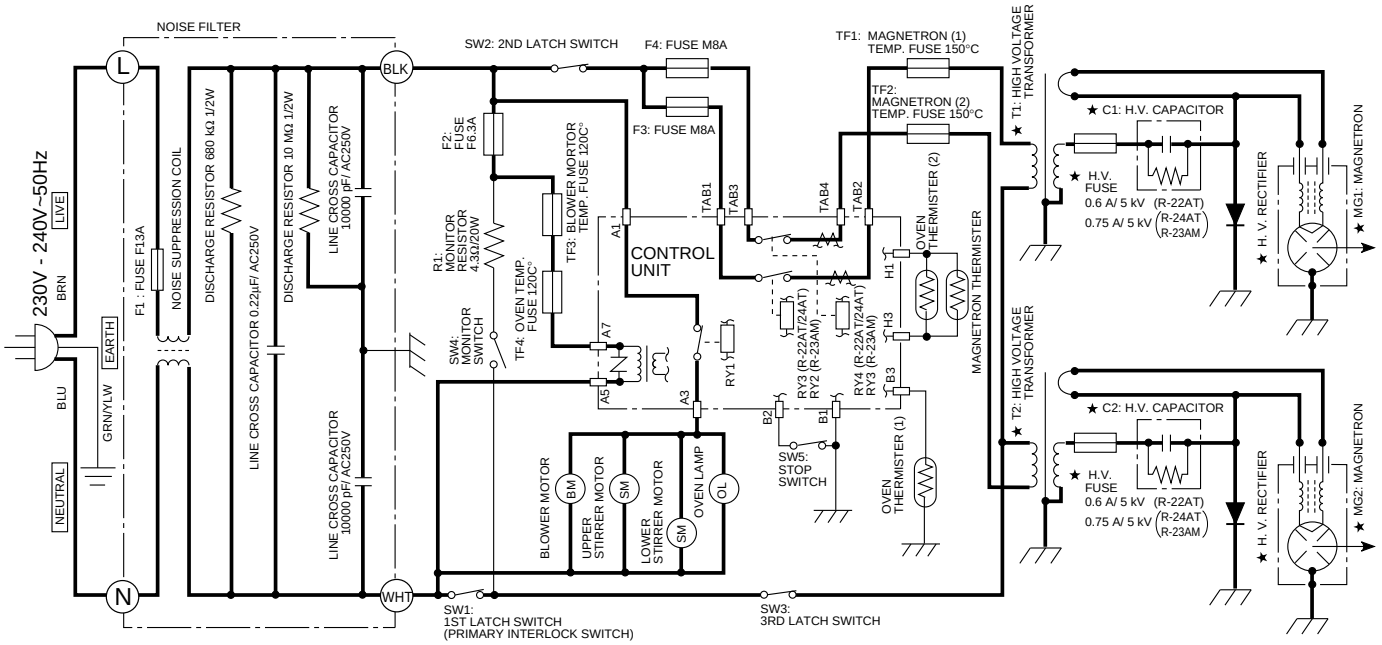


Figure O-3 Oven Schematic-Cooking Condition

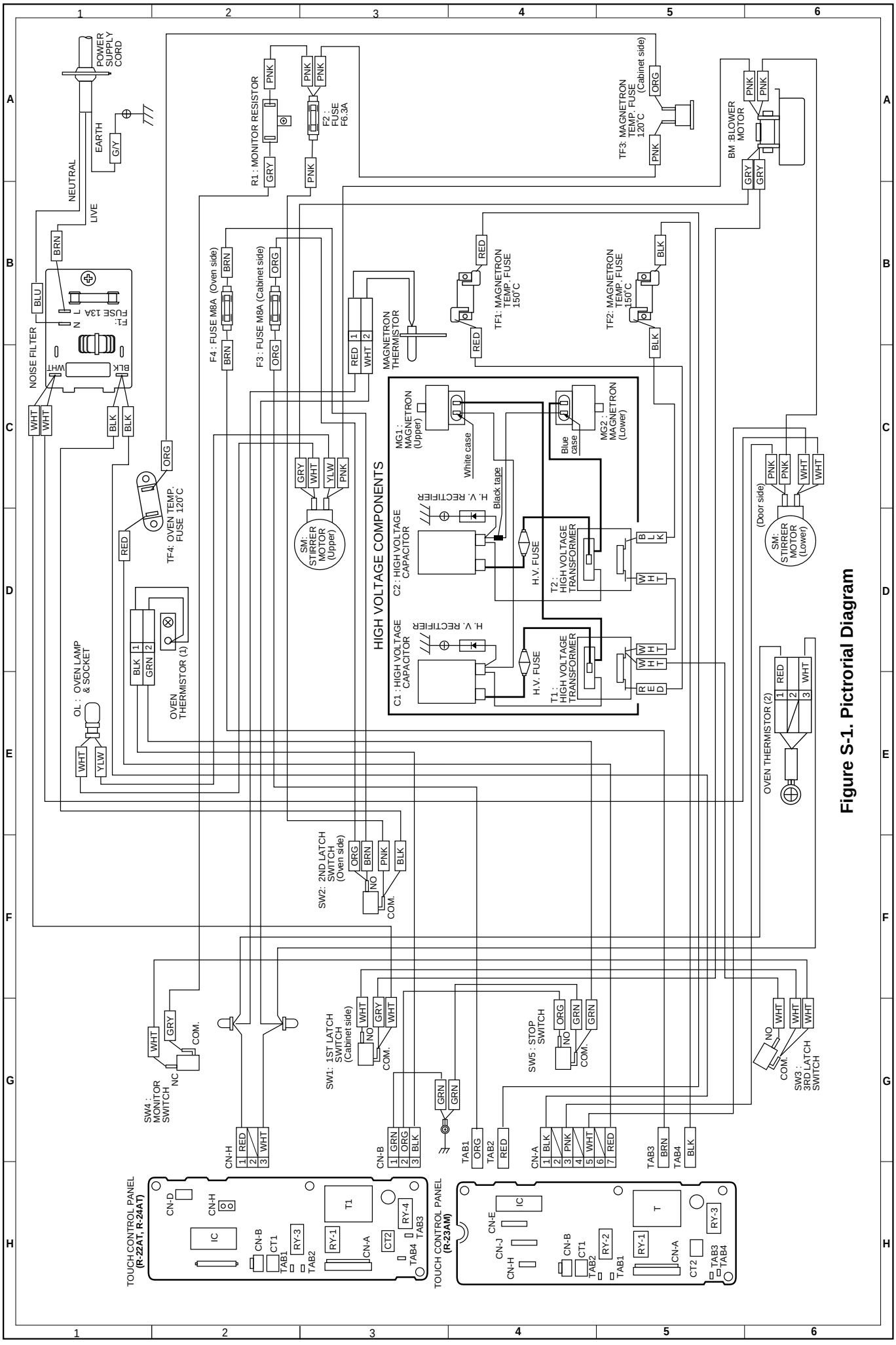


Figure S-1. Pictorial Diagram

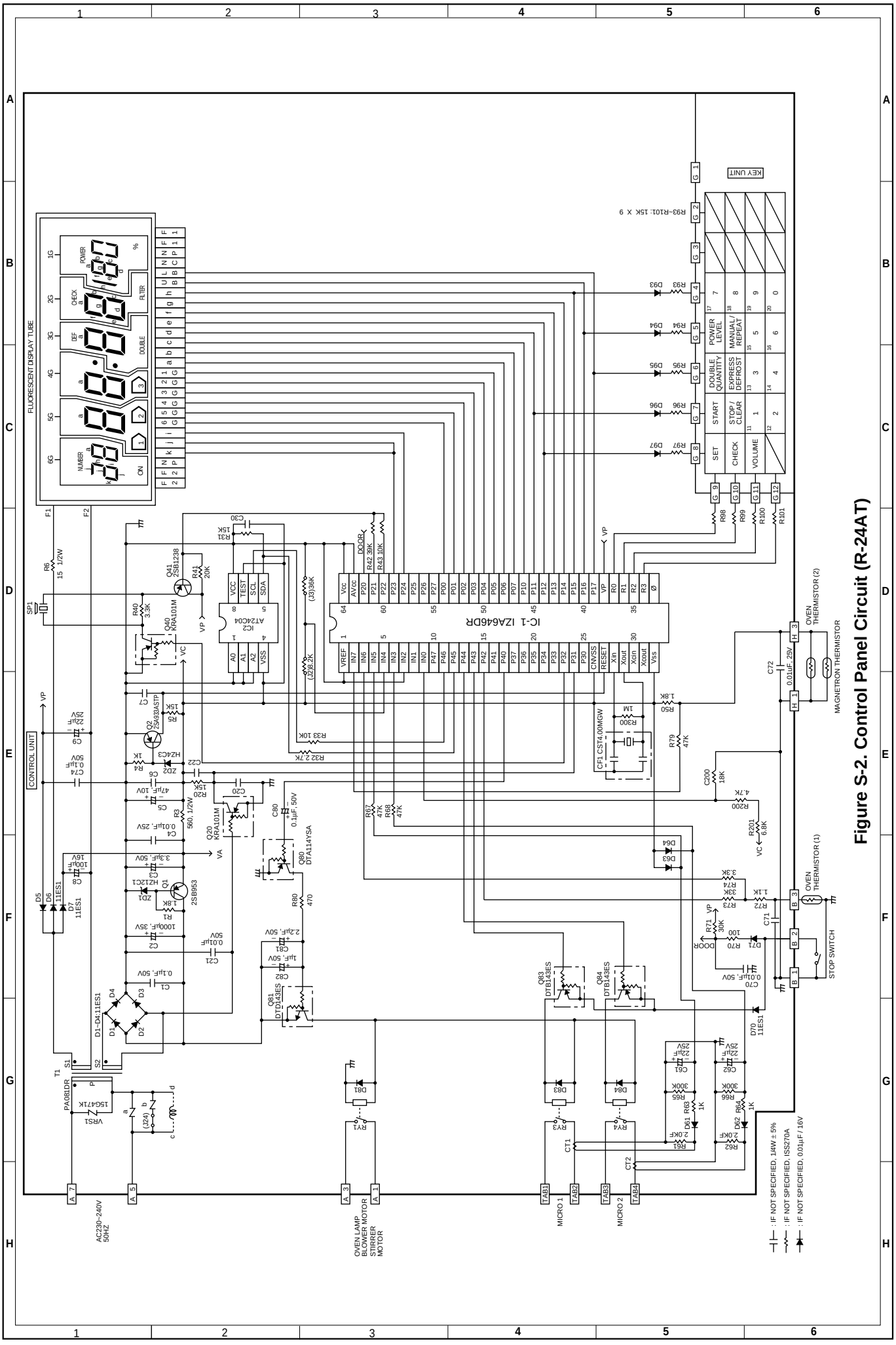


Figure S-2. Control Panel Circuit (R-24AT)

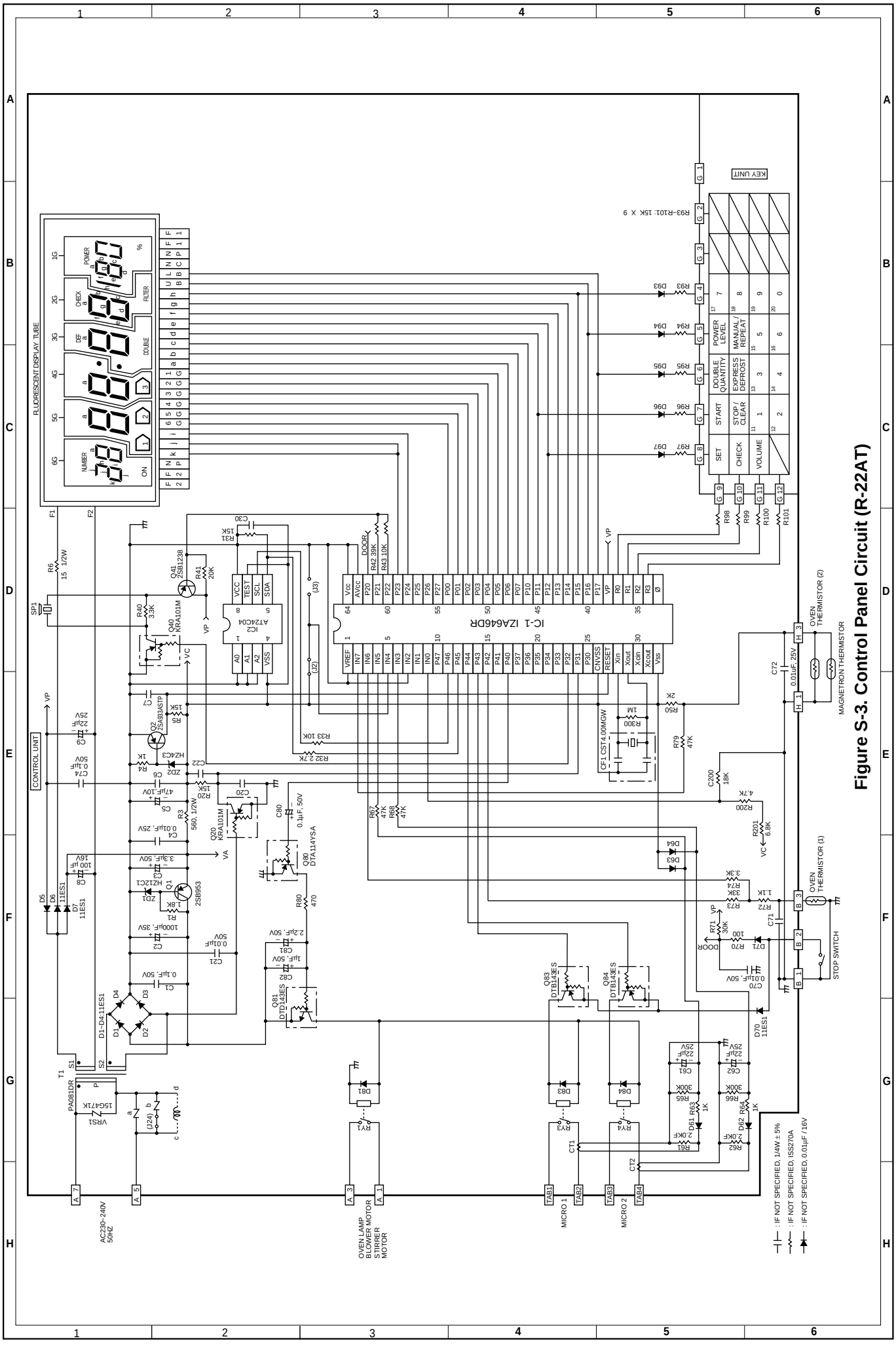


Figure S-3. Control Panel Circuit (R-22AT)

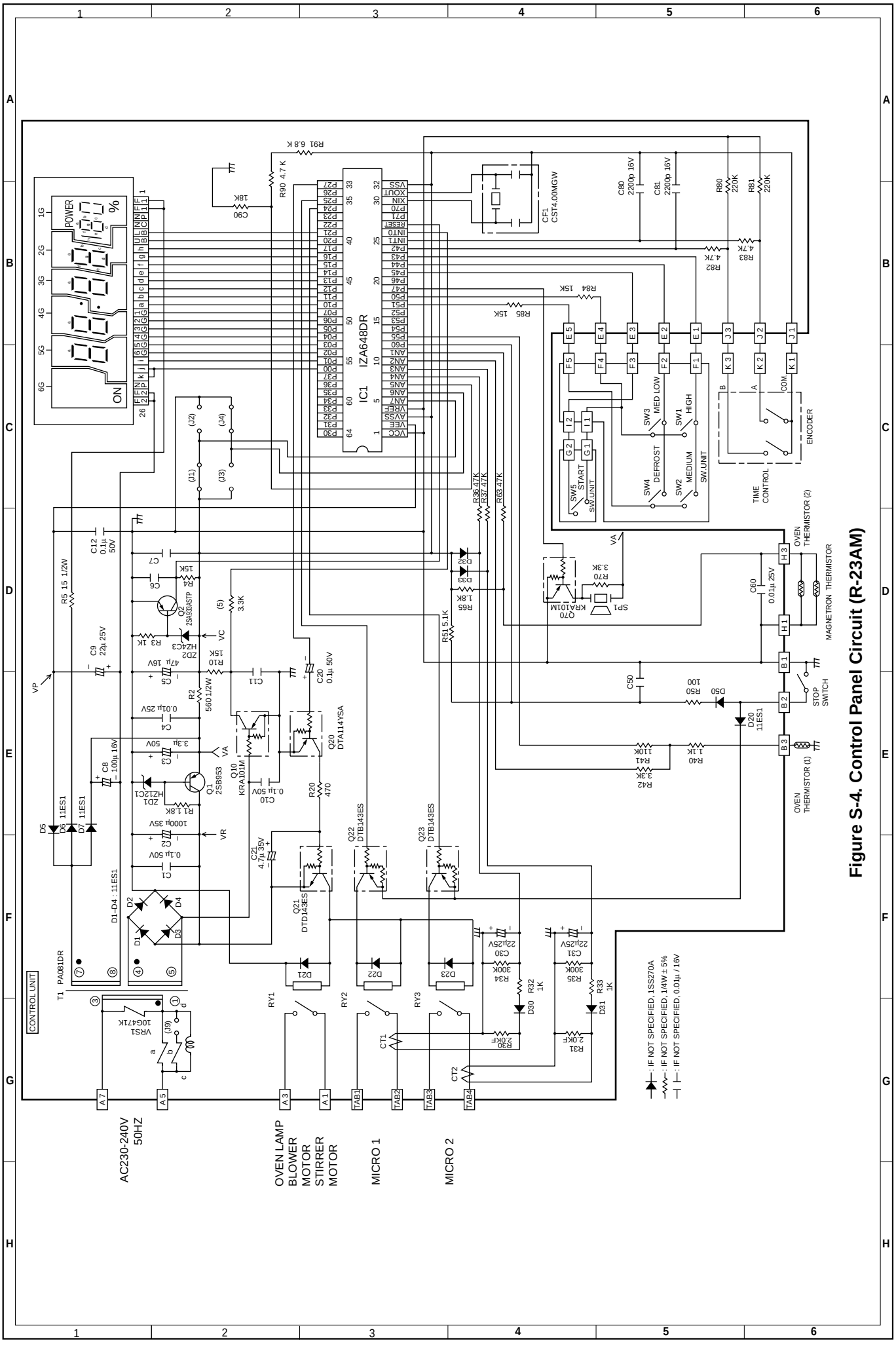


Figure S-4. Control Panel Circuit (R-23AM)

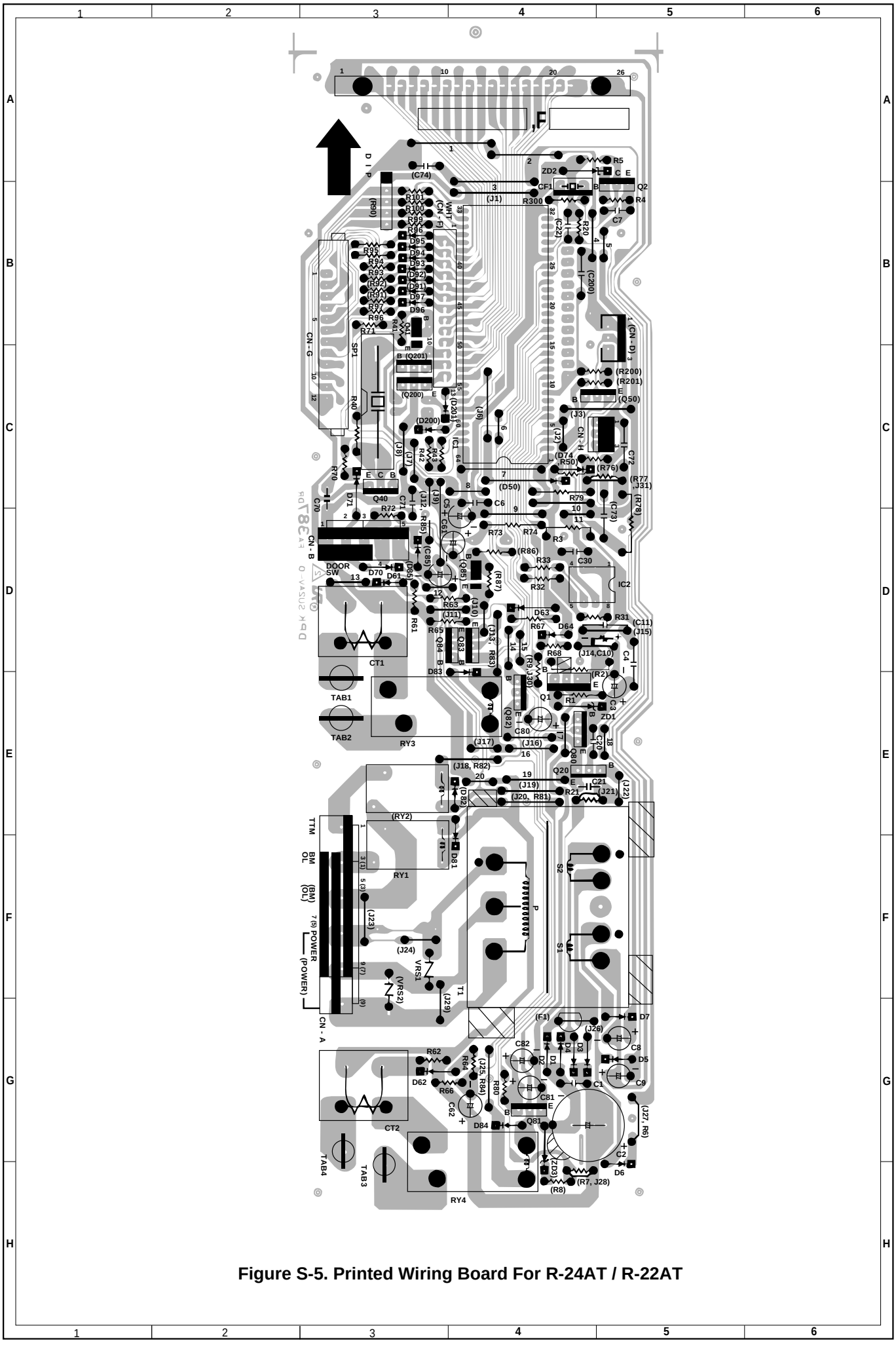


Figure S-5. Printed Wiring Board For R-24AT / R-22AT

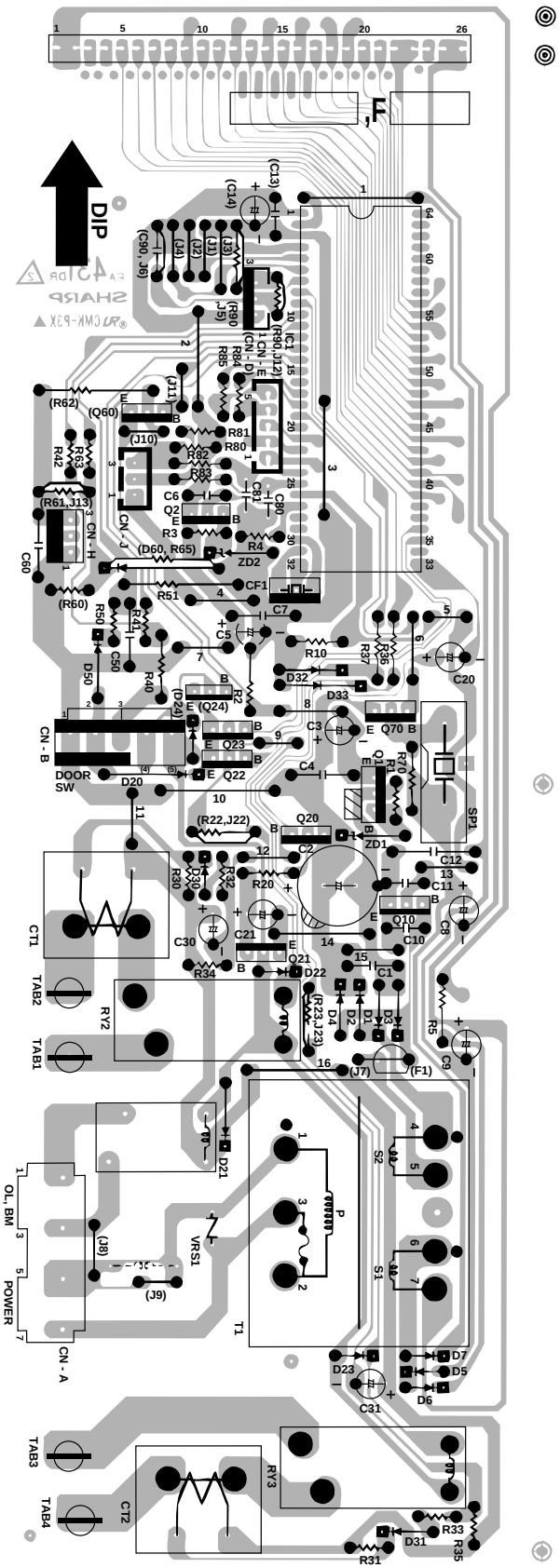


Figure S-6. Printed Wiring Board For R-23AM

PARTS LIST

Note: The parts marked "Δ" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V.

	REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
			ELECTRIC PARTS		
	1- 1	FH-HZA064WRE0	Oven thermistor (2)	1	AV
	1- 2	QSOCLA024WRE0	Oven lamp socket	1	AH
Δ*	1- 3	RV-MZA300WRE0	Magnetron	2	BG
	1- 4	FMOTEA309WRK0	Blower motor	1	BH
	1- 5	QFSHDA019WRE0	Fuse holder	3	AH
	1- 6	FACCBA011WRK0	Power supply cord	1	AZ
	1- 7	FH-HZA070WRE0	Oven thermistor (1) & Magnetron thermistor	2	AM
*	1- 8	FW-QZA117WRK0	High voltage rectifier assembly	1	AU
*	1- 9	QFS-IA002WRE0	High voltage fuse 0.75A/ 5kV [R-24AT/23AM]	2	AQ
*	1- 9	QFS-IA004WRE0	High voltage fuse 0.6A/ 5kV [R-22AT]	2	AK
	1-10	FPWBFA334WRE0	Noise filter	1	AS
	1-11	RR-WZA020WRE0	Monitor resistor 4.3 ohm 20W	1	AF
*	1-12	RC-QZA264WRE0	High voltage capacitor	2	AY
	1-13	RLMPTA028WRE0	Oven lamp	1	AK
	1-14	RMOTDA238WRZZ	Stirrer motor	2	AR
	1-15	QFS-TA014WRE0	Temperature fuse 150˚C (MG.)	2	AG
	1-16	QFS-TA015WRE0	Temperature fuse 120˚C (OVEN, BM.)	2	AG
*	1-17	RTRN-A599WRE0	High voltage transformer [R-23AM/R-24AT]	2	BM
*	1-17	RTRN-A600WRE0	High voltage transformer [R-22AT]	2	BN
	1-18	QSW-MA085WRE0	Stop switch	1	AF
	1-19	QSW-MA086WRE0	Monitor switch	1	AF
	1-20	QSW-MA095WRE0	1st. latch switch	1	AF
	1-21	QSW-MA095WRE0	2nd. latch switch	1	AF
	1-22	QSW-MA095WRE0	3rd. latch switch	1	AF
	1-23	QFS-CA009WRE0	Fuse 13A	1	AD
	1-24	QFS-CA007WRE0	Fuse 6.3A	1	AD
	1-25	QFS-CA010WRE0	Fuse M8A	2	AE
			CABINET PARTS		
	2- 1	FDAI-A183WRW0	Base plate assembly	1	BC
	2- 2	PSHEGA006WRE0	Rubber sheet A	2	AF
	2- 3	PSHEGA007WRE0	Rubber sheet B	2	AE
	2- 4	GCOVAA283WRW0	Rear cabinet	1	AX
	2- 5	FFTASA064WRY0	Oven lamp access cover assembly	1	AN
	2-5-1	PCUSU0407WRP0	Cushion	1	AA
	2-5-2	PREFHA059WRP0	Reflector	1	AF
	2- 6	GCABUA523WRP0	Outer case cabinet	1	BA
	2- 7	FFPF-A016WRK0	Vibration-proof sheet	1	AU
	2- 8	PZETEA079WRP0	Insulation sheet	2	AC
			OVEN PARTS		
	4- 1	PZETEA047WRP0	Switch insulator	1	AC
	4- 2	FDUC-A345WRY0	Exhaust duct assembly	1	AP
Δ	4- 3	FOVN-A444WRY0	Oven cavity	1	BS
	4- 4	PFILWA053WRP0	Oven light screen (Inside)	1	AE
	4- 5	MLEVPA153WRF0	Switch lever A	1	AC
	4- 6	MLEVPA154WRF0	Switch lever B	1	AC
	4- 7	MLEVPA155WRF0	Switch lever C	1	AC
	4- 8	MSPRCA075WRE0	Switch spring A	1	AB
	4- 9	MSPRCA076WRE0	Switch spring B	2	AB
Δ	4-10	PHOK-A081WRF0	Latch hook	1	AP
Δ	4-11	MHNG-A216WRM0	Lower oven hinge	1	AG
	4-12	PCUSUA442WRP0	Cushion	1	AF
	4-13	PCUSU0407WRP0	Cushion	1	AA
	4-14	FGLSPA063WRY0	Ceramic shelf	1	BF
	4-15	FPLT-A008WRY0	Stirrer antenna upper assembly	1	AV
	4-16	FPLT-A009WRY0	Stirrer antenna lower assembly	1	AV
	4-17	LANGKA762WRP0	Partition angle R	1	AE
	4-18	LANGQA370WRP0	Oven lamp mounting plate	1	AD
	4-19	LBNDKA068WRP0	Capacitor holder	1	AD
	4-20	PGIDHA054WRW0	Water-proof cover	1	AF
	4-21	NSFTPA031WRF0	Antenna motor shaft	2	AH
	4-22	PCUSUA451WRP0	Cushion	1	AB
	4-23	PCUSUA417WRP0	Cushion	1	AB
Δ	4-24	MHNG-A215WRM0	Upper oven hinge	1	AG
	4-25	PCUSUA413WRP0	Cushion	1	AG
	4-26	PCUSUA415WRP0	Cushion	3	AC
	4-27	PDUC-A729WRF0	Air duct	1	AL
	4-28	PDUC-A564WRW0	Mg exhaust duct	1	AP
	4-29	PCUSUA414WRP0	Cushion	1	AD
	4-30	LANGKA679WRM0	Fixing angle S	1	AD
	4-31	HDECQA147WRM0	Corner cap right	1	AE
	4-32	LANGFA195WRP0	Chassis support	1	AG

Note: The parts marked "Δ" may cause undue microwave exposure.
The parts marked "*" are used in voltage more than 250V.

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
4-33	LBSHCA012WRE0	Cord bushing	1	AD
4-34	PCOVPA351WRF0	Stirrer cover	1	BA
4-35	FFIL-A005WRK0	Air intake filter assembly	1	AS
4-36	HDECEA001WRP0	Decoration sash	1	AR
4-37	HDECQA146WRM0	Corner cap left	1	AE
4-38	PCUSGA409WRP0	Cushion	2	AE
4-39	LANGQA440WRM0	Earth angle	1	AE
4-40	LANGQA512WRP0	Thermistor angle	1	AE
4-41	PCUSUA458WRP0	Cushion	1	AB
4-42	LANGQA514WRW0	Noise filter angle	1	AF
4-43	PCUSUA268WRP0	Cushion	1	AA
4-44	MSPRCA101WRE0	Switch lever spring C	1	AC

DOOR PARTS

Δ	5	DDORFA746WRK0	Door assembly	1	BP
Δ	5- 1	FDORFA289WRT0	Door panel assembly	1	BH
	5- 2	GCOVAA242WRY0	Door case	1	BD
	5- 3	FHNDMA011WRY0	Door lever assembly	1	AP
	5- 4	GCOVHA350WRF0	Choke cover	1	AR
	5- 5	JHNDPA169WRM0	Door handle	1	AU
	5- 6	LANGKA766WRP0	Outside window fixing plate	2	AF
	5- 7	PCUSGA430WRP0	Cushion	2	AM
	5- 8	PGLSPA457WRE0	Door glass	1	AV
	5- 9	PPACGA142WRP0	Door case packing	2	AF
	5-10	PSHEPA428WRE0	Sealer film	1	AF
	5-11	XWSSD40-10000	Washer : 4mm x 1mm	2	AA
	5-12	XFPSD40P08K00	Screw : 4mm x 8mm	3	AA
	5-13	XHTSD40P08RV0	Screw : 4mm x 8mm	4	AA
	5-14	FANGKA200WRY0	Latch fixing angle	1	AQ
	5-15	FLEVFA019WRY0	Joint lever	1	AP
Δ	5-16	LSTPCA002WRM0	Latch head	2	AM
	5-17	MLEVPA220WRF0	Head lever	1	AM
	5-18	MSPRCA097WRE0	Latch spring	1	AG
	5-19	HBDGCA091WRE0	Door badge [R-24AT]	1	AF
	5-19	HBDGCA092WRE0	Door badge [R-23AM]	1	AF
	5-19	HBDGCA094WRE0	Door badge [R-22AT]	1	AF
	5-20	XEPSD40P20000	Screw : 4mm x 20mm	2	AB
	5-21	PCUSUA523WRP0	Door lever cushion	2	AE
	5-22	PSPA-A102WRE0	Door case spacer	2	AE

MISCELLANEOUS

6- 1	TINSEA821WRR0	Operation manual [R-22AT, R-24AT]	1	AG
6- 1	TINSEA822WRR0	Operation manual [R-23AM]	1	AG
6- 2	TLABHA029WRR0	Menu sticker [R-22AT, R-24AT]	1	AC
6- 3	FW-VZB769WRE0	Switch harness	1	AR
6- 4	FW-VZB765WRE0	Main wire harness	1	BB
6- 5	TLAB-A186WRR0	AL label	1	AB
6- 6	LBNDKA079WRE0	Wire holder	3	AB
6- 7	PTUB-A048WRZZ	Tube	1	AF
6- 8	TCAUH0057YBR0	Lamp caution	1	AD
6- 9	TSPCNC828WRR0	Rating label [R-24AT]	1	AH
6- 9	TSPCNC830WRR0	Rating label [R-23AM]	1	AH
6- 9	TSPCNC832WRR0	Rating label [R-22AT]	1	AH
6-10	TCAUAA205WRR0	Cord caution	1	AE
6-11	TCAUH0114WRR0	Caution label	1	AC
6-12	TCAUHA257WRR0	S caution sheet	1	AE
6-13	LHOLDA004WRE0	Cord holder	1	AA
6-14	PZET-A018WRE0	Terminal insulator	2	AC
6-15	TLABSA065WRR0	BS 13 label	1	AC
6-16	LHLDWQ004YBE0	Purse lock L	1	AA
6-17	TLABSA069WRR0	Fuse label F6.3A	1	AB
6-18	TLABSA070WRR0	Fuse label M8A	2	AB
6-19	TLABSA066WRR0	Equipotential label	1	AD

SCRE,NUTS AND WASHERS

7- 1	XCBWW30P08000	Screw : 3mm x 8mm	2	AB
7- 2	XBPSD30P28KS0	Screw : 3mm x 28mm	1	AA
7- 3	XNESD30-24000	Nut : 3mm x 2.4mm	1	AA
7- 4	LX-BZA130WRE0	Special screw	1	AD
7- 5	LX-BZA116WRE0	Special screw	2	AD
7- 6	XBPWW40P04000	Screw : 4mm x 4mm	4	AB
7- 7	LX-BZA041WRE0	Special screw	2	AA
7- 8	LX-BZA125WRE0	Special screw	2	AB
7- 9	LX-CZA038WRE0	Special screw	2	AA
7-10	LX-EZA004WRE0	Special screw	2	AA
7-11	XOTSD40P06000	Screw : 4mm x 6mm	2	AA

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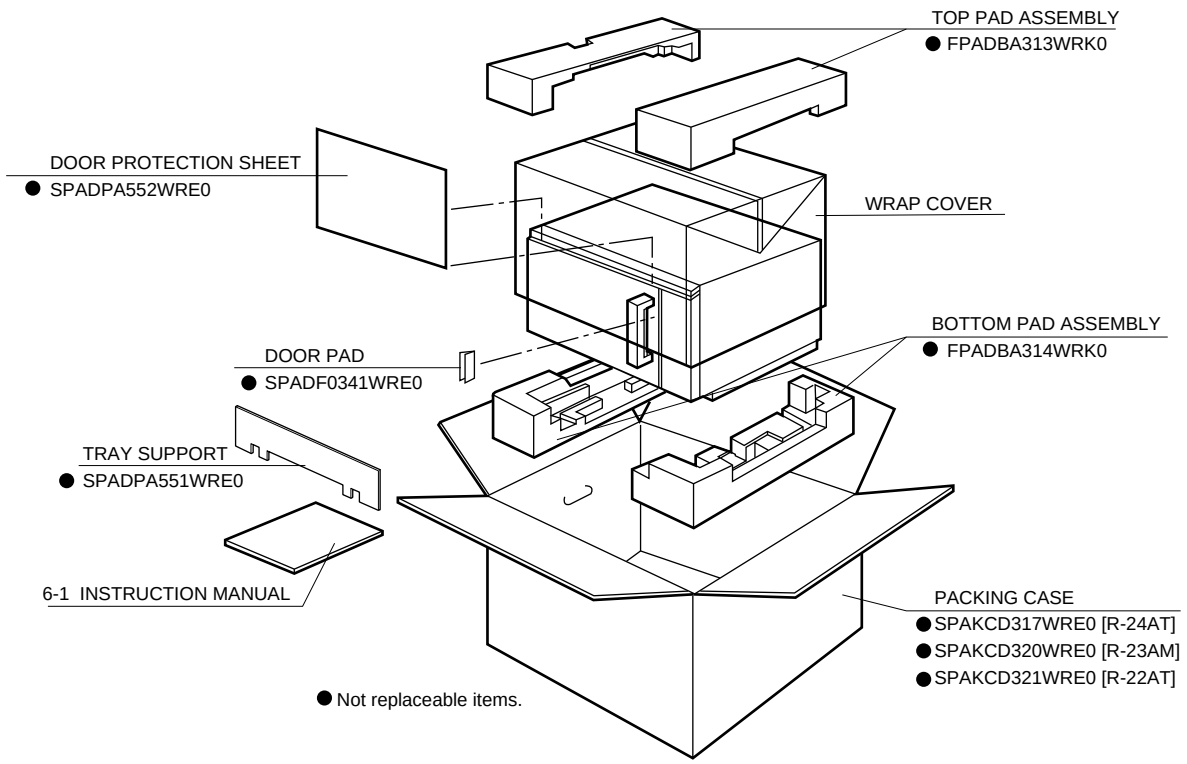
REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
7-12	LX-NZ0082WRE0	Special nut	1	AA
7-13	XFTSD40P12000	Screw : 4mm x 12mm	1	AA
7-14	XHPSD50P08000	Screw : 5mm x 8mm	8	AB
7-15	XBPSD50P12KS0	Screw : 5mm x 12mm	4	AA
7-16	XHTSD40P08RV0	Screw : 4mm x 8mm	17	AA
7-17	XOTSD40P12000	Screw : 4mm x 12mm	6	AA
7-18	XOTWW40P10000	Screw : 4mm x 10mm	12	AB
7-19	XJPSD40P10000	Screw : 4mm x 10mm	2	AA
7-20	XCPSD30P10000	Screw : 3mm x 10mm	3	AA
7-21	LX-WZA035WRE0	Special washer	2	AB
7-22	XOTWW40P08000	Screw : 4mm x 8mm	7	AB
7-23	PSPA-A101WRE0	Special washer	4	AB
7-24	XCPSD30P06000	Screw : 3mm x 6mm	2	AA
7-25	LX-BZA064WRE0	Special screw	1	AA
7-26	XOTSC40P12000	Screw : 4mm x 12mm	5	AA
7-27	LX-EZA042WRE0	Special screw	4	AB
7-28	XFTSD40P08000	Screw : 4mm x 8mm	1	AA
7-29	XTPSD40P08000	Screw : 4mm x 8mm	2	AA
7-30	XWWSD50-06000	Washer : 5mm x 0.6mm	4	AA
7-31	XONSC40P10000	Screw : 4mm x 10mm	1	AA
7-32	XWSSD40-10000	Washer : 4mm x 1.0mm	1	AA
7-33	XOTSD40P10RV0	Screw : 4mm x 10mm	1	AA

HOW TO ORDER REPLACEMENT PARTS

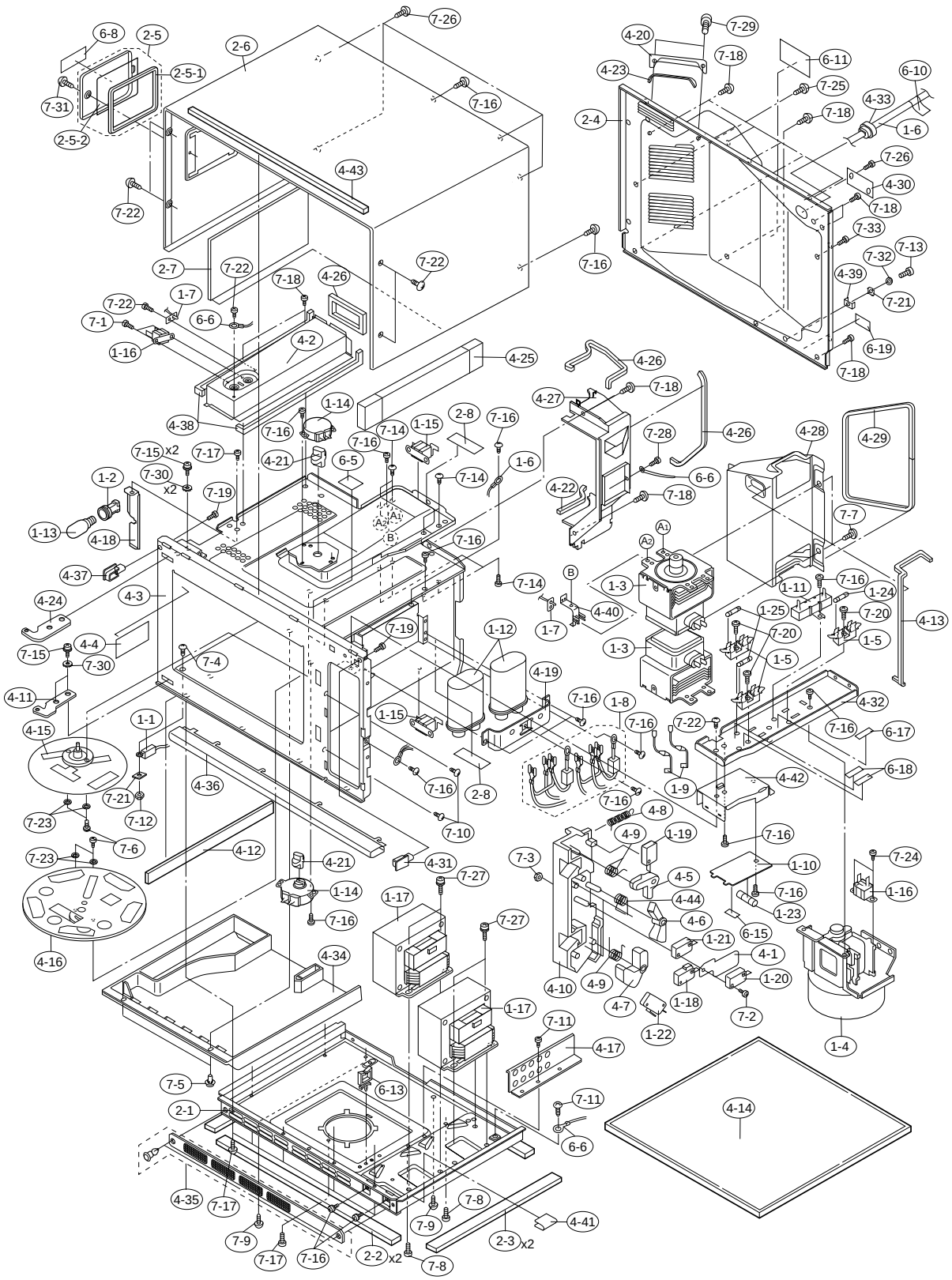
To have your order filled prompty and correctly, please furnish the following information.

1. MODEL NUMBER 2. REF. NO. 3. PART NO. 4. DESCRIPTION

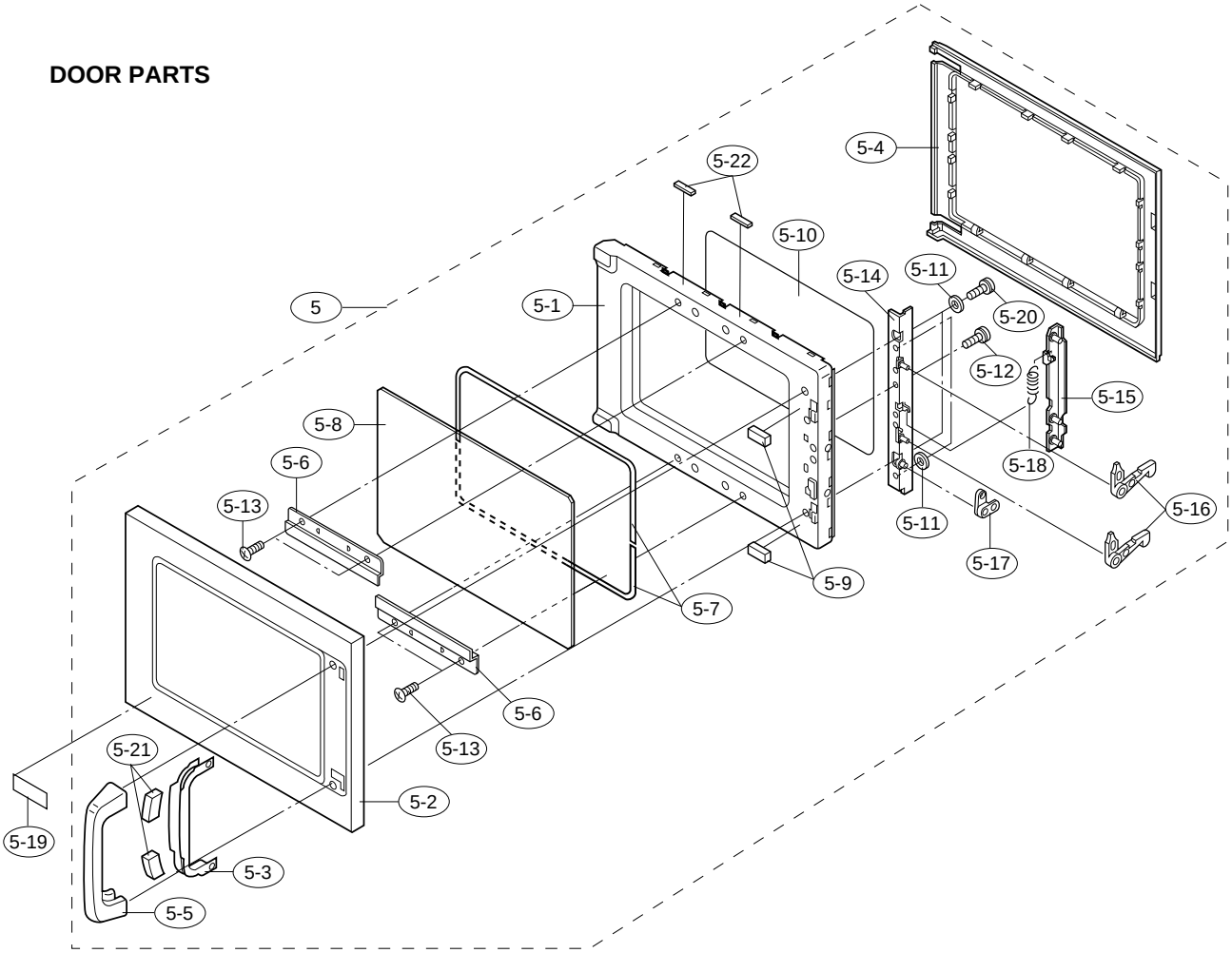
PACKING AND ACCESSORIES



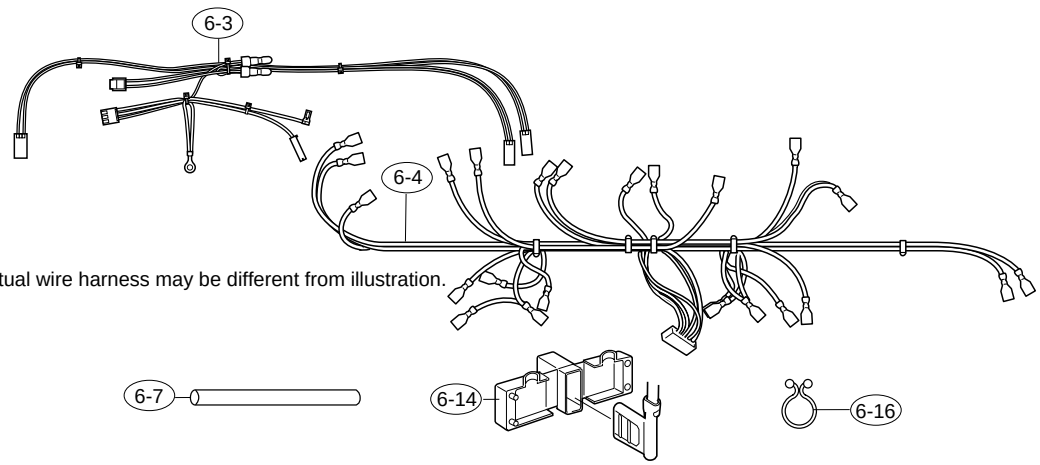
OVEN AND CABINET PARTS



DOOR PARTS



MISCELLANEOUS



Actual wire harness may be different from illustration.

CONTROL PANEL PARTS FOR R-24AT / R-22AT

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
3- 1	DPWBFB998WRU0	Control unit [R-24AT]	1	BN
3- 1	DPWBFC005WRU0	Control unit [R-22AT]	1	BN
3- 1A	QCNCMA308DRE0	4-pin connector (A)	1	AC
3- 1B	QCNCMA312DRE0	3-pin connector (B)	1	AB
3- 1C	QCNCWA030DRE0	12-pin connector (G)	1	AF
3- 1D	QCNCMA039DRE0	3-pin connector (H)	1	AB
3- 1E	QLUG-A002PRE0	Tab terminal (TAB1-4)	4	AB
3- 1F	RV-KXA053DRE0	Fluorescent display tube	1	AW
3- 1G	PCUSGA359WRP0	Cushion	2	AC
C1	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C2	RC-EZA192DRE0	Capacitor 1000 uF 35V	1	AD
C3	VCEAB31HW335M	Capacitor 3.3 uF 50V	1	AA
C4	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C5	VCEAB31AW476M	Capacitor 47 uF 10V	1	AA
C6-7	VCKYD11CY103N	Capacitor 0.01 uF 16V	2	AA
C8	VCEAB31CW107M	Capacitor 100 uF 16V	1	AB
C9	VCEAB31EW226M	Capacitor 22 uF 25V	1	AA
C20	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C21	VCKYF31HF103Z	Capacitor 0.01 uF 50V	1	AA
C22	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C30	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C61-62	VCEAB31EW226M	Capacitor 22 uF 25V	2	AA
C70	VCKYF31HF103Z	Capacitor 0.01 uF 50V	1	AA
C71	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C72	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C74	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C80	VCEAB31HW104M	Capacitor 0.1 uF 50V	1	AM
C81	VCEAB31HW225M	Capacitor 2.2 uF 50V	1	AA
C82	VCEAB31HW105M	Capacitor 1.0 uF 50V	1	AA
C200	VRD-B12EF183J	Resistor 18k ohm 1/4W	1	AA
CF1	RCRS-A010DRE0	Ceramic resonator (CST4.00MGW)	1	AD
D1-4	VHD11ES1//-1	Diode (11ES1)	4	AB
D5	VHD1SS270A/-1	Diode (1SS270A)	1	AA
D6-7	VHD11ES1//-1	Diode (11ES1)	2	AB
D61-64	VHD1SS270A/-1	Diode (1SS270A)	4	AA
D70	VHD11ES1//-1	Diode (11ES1)	1	AB
D71	VHD1SS270A/-1	Diode (1SS270A)	1	AA
D81	VHD1SS270A/-1	Diode (1SS270A)	1	AA
D83-84	VHD1SS270A/-1	Diode (1SS270A)	2	AA
D93-97	VHD1SS270A/-1	Diode (1SS270A)	5	AA
IC1	RH-IZA646DRE0	LSI	1	AX
IC2	RH-IZA571DRE0	IC (AT24C04)	1	AP
Q1	VS2SB953-PQ-4	Transistor (2SB953)	1	AG
Q2	VS2SA933AS/-3	Transistor (2SA933ASTP)	1	AB
Q20	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
Q40	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
Q41	VS2SB1238//-3	Transistor (2SB1238)	1	AA
Q80	VSDTA114YSA-3	Transistor (DTA114YSA)	1	AB
Q81	VSDTD143ES/-3	Transistor (DTD143ES)	1	AC
Q83-84	VSDTB143ES/-3	Transistor (DTB143ES)	2	AC
R1	VRD-B12EF182J	Resistor 1.8k ohm 1/4W	1	AA
R3	VRD-B12HF561J	Resistor 560 ohm 1/2W	1	AA
R4	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	1	AA
R5	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R6	VRD-B12HF150J	Resistor 15 ohm 1/2W	1	AA
R20	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R31	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R32	VRD-B12EF272J	Resistor 2.7k ohm 1/4W	1	AA
R33	VRD-B12EF103J	Resistor 10k ohm 1/4W	1	AA
R40	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R41	VRD-B12EF203J	Resistor 20k ohm 1/4W	1	AA
R42	VRD-B12EF393J	Resistor 39k ohm 1/4W	1	AA
R43	VRD-B12EF103J	Resistor 10k ohm 1/4W	1	AA
R50	VRD-B12EF182J	Resistor 1.8k ohm 1/4W [R-24AT]	1	AA
R50	VRD-B12EF202J	Resistor 2.0k ohm 1/4W [R-22AT]	1	AA
R61-62	VRN-B12EK202F	Resistor 2.0k ohm(F) 1/4W	2	AA
R63-64	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	2	AA
R65-66	VRD-B12EF304J	Resistor 300k ohm 1/4W	2	AA
R67-68	VRD-B12EF473J	Resistor 47k ohm 1/4W	2	AA
R70	VRD-B12EF101J	Resistor 100 ohm 1/4W	1	AA
R71	VRD-B12EF303J	Resistor 30k ohm 1/4W	1	AA
R72	VRD-B12EF112J	Resistor 1.1k ohm 1/4W	1	AA
R73	VRD-B12EF333J	Resistor 33k ohm 1/4W	1	AA
R74	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R79	VRD-B12EF473J	Resistor 47k ohm 1/4W	1	AA
R80	VRD-B12EF471J	Resistor 470 ohm 1/4W	1	AA
R93-101	VRD-B12EF153J	Resistor 15k ohm 1/4W	9	AA

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
R200	VRD-B12EF472J	Resistor 4.7k ohm 1/4W	1	AA
R201	VRD-B12EF682J	Resistor 6.8k ohm 1/4W	1	AA
R300	VRD-B12EF105J	Resistor 1.0M ohm 1/4W	1	AA
(J2)	VRD-B12EF822J	Resistor 8.2k ohm 1/4W [R-24AT]	1	AB
(J3)	VRD-B12EF363J	Resistor 36k ohm 1/4W [R-24AT]	1	AA
RY1	RRLY-A078DRE0	Relay (OJ-SH-118LM)	1	AG
RY3-4	RRLY-A087DRE0	Relay (VS18MB)	2	AN
SP1	RALM-A014DRE0	Buzzer (PKM22EPT)	1	AG
T1	RTRNPA081DRE0	Touch control transformer	1	AU
CT1-2	RTRN-A060DRE0	Current transformer	2	AH
VRS1	RH-VZA010DRE0	Varistor (TNR15G471K)	1	AE
ZD1	VHEHZ12C1//-1	Zener diode (HZ12C1)	1	AA
ZD2	VHEHZ4C3///-1	Zener diode (HZ4C3)	1	AA
3- 2	FPNLCB469WRK0	Control panel frame with key unit assembly	1	BA
3- 2-1	FUNTKA964WRE0	Key unit	1	AW
3- 2-2	HDECAA195WRP0	Decoration metal fittings	1	AP
3- 2-3	PCUSUA451WRP0	Cushion	1	AB
3- 3	LANGTA243WRW0	Control panel mounting angle	1	AF
3- 4	XEPSD30P10XS0	Screw; control unit mounting	6	AA
3- 5	XEPSD40P12000	Screw; control panel mounting angle mounting	1	AA
3- 6	XHTSD40P08RV0	Screw; decoration panel mounting	1	AA
3- 7	XCTSD40P08000	Screw; decoration panel mounting for earth	1	AA

HOW TO ORDER REPLACEMENT PARTS

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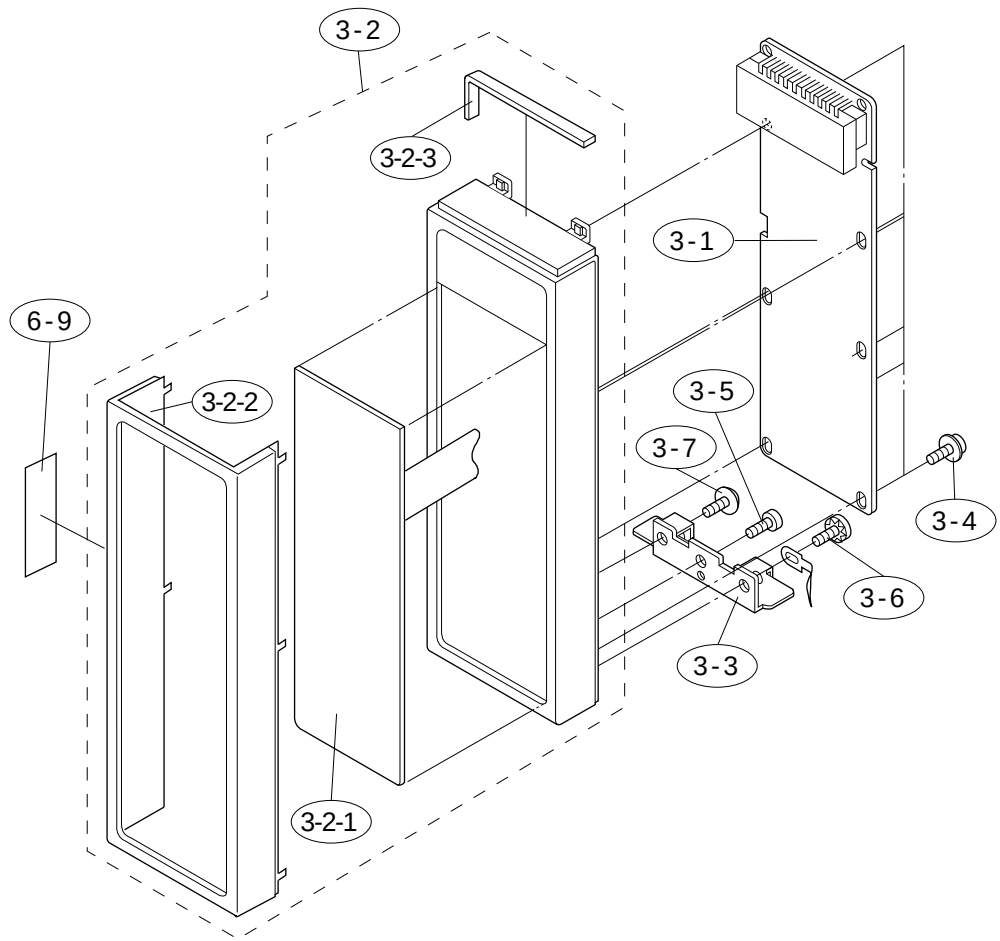
1. MODEL NUMBER 2. REF. NO. 3. PART NO. 4. DESCRIPTION

CONTROL PANEL PARTS

R-22AT, R-24AT



CONTROL PANEL PARTS FOR R-23AM

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
3- 1	DPWBFC003WRU0	Control unit	1	BL
3- 1A	QCNCMA308DRE0	4-pin connector (A)	1	AC
3- 1B	QCNCMA312DRE0	3-pin connector (B)	1	AB
3- 1C	QCNCMA381DRE0	5-pin connector (E)	1	AD
3- 1D	QCNCMA039DRE0	3-pin connector (H)	1	AB
3- 1E	QCNCMA338DRE0	3-pin connector (J)	1	AB
3- 1F	QLUG-A002PRE0	Tab terminal (TAB1-4)	4	AB
3- 1G	RV-KXA053DRE0	Fluorescent display tube	1	AW
3- 1H	PCUSGA400WRP0	Cushion	2	AC
C1	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C2	RC-EZA192DRE0	Capacitor 1000 uF 35V	1	AD
C3	VCEAB31HW335M	Capacitor 3.3 uF 50V	1	AA
C4	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C5	VCEAB31CW476M	Capacitor 47 uF 16V	1	AA
C6-7	VCKYD11CY103N	Capacitor 0.01 uF 16V	2	AA
C8	VCEAB31CW107M	Capacitor 100 uF 16V	1	AB
C9	VCEAB31EW226M	Capacitor 22 uF 25V	1	AA
C10	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C11	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C12	VCKYD11HF104Z	Capacitor 0.1 uF 50V	1	AB
C20	VCEAB31HW104M	Capacitor 0.1 uF 50V	1	AM
C21	VCEAB31VW475M	Capacitor 4.7 uF 35V	1	AA
C30-31	VCEAB31EW226M	Capacitor 22 uF 25V	2	AA
C50	VCKYD11CY103N	Capacitor 0.01 uF 16V	1	AA
C60	VCKYB11EX103N	Capacitor 0.01 uF 25V	1	AA
C80-81	RC-KZA129DRE0	Capacitor 2200 pF 16V	2	AB
C90	VRD-B12EF183J	Resistor 18k ohm 1/4W	1	AA
CF1	RCRS-A010DRE0	Ceramic resonator CST4.00MGW	1	AD
D1-4	VHD11ES1//-1	Diode (11ES1)	4	AB
D5	VHD1SS270A/-1	Diode (1SS270A)	1	AA
D6-7	VHD11ES1//-1	Diode (11ES1)	2	AB
D20	VHD11ES1//-1	Diode (11ES1)	1	AB
D21-23	VHD1SS270A/-1	Diode (1SS270A)	3	AA
D30-33	VHD1SS270A/-1	Diode (1SS270A)	4	AA
D50	VHD1SS270A/-1	Diode (1SS270A)	1	AA
IC1	RH-IZA648DRE0	LSI	1	AV
Q1	VS2SB953-PQ-4	Transistor (2SB953)	1	AG
Q2	VS2SA933AS/-3	Transistor (2SA933ASTP)	1	AB
Q10	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
Q20	VSDTA114YSA-3	Transistor (DTA114YSA)	1	AB
Q21	VSDTD143ES/-3	Transistor (DTD143ES)	1	AC
Q22-23	VSDTB143ES/-3	Transistor (DTB143ES)	2	AC
Q70	RH-TZA037CBE0	Transistor (KRA101M)	1	AA
R1	VRD-B12EF182J	Resistor 1.8k ohm 1/4W	1	AA
R2	VRD-B12HF561J	Resistor 560 ohm 1/2W	1	AA
R3	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	1	AA
R4	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R5	VRD-B12HF150J	Resistor 15 ohm 1/2W	1	AA
R10	VRD-B12EF153J	Resistor 15k ohm 1/4W	1	AA
R20	VRD-B12EF471J	Resistor 470 ohm 1/4W	1	AA
R30-31	VRD-B12EF202J	Resistor 2.0k ohm 1/4W	2	AA
R32-33	VRD-B12EF102J	Resistor 1.0k ohm 1/4W	2	AA
R34-35	VRD-B12EF304J	Resistor 300k ohm 1/4W	2	AA
R36-37	VRD-B12EF473J	Resistor 47k ohm 1/4W	2	AA
R40	VRD-B12EF112J	Resistor 1.1k ohm 1/4W	1	AA
R41	VRD-B12EF114J	Resistor 110k ohm 1/4W	1	AA
R42	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R50	VRD-B12EF101J	Resistor 100 ohm 1/4W	1	AA
R51	VRD-B12EF512J	Resistor 5.1k ohm 1/4W	1	AA
R63	VRD-B12EF473J	Resistor 47k ohm 1/4W	1	AA
R65	VRD-B12EF182J	Resistor 1.8k ohm 1/4W	1	AA
R70	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
R80-81	VRD-B12EF224J	Resistor 220k ohm 1/4W	2	AA
R82-83	VRD-B12EF472J	Resistor 4.7k ohm 1/4W	2	AA
R84-85	VRD-B12EF153J	Resistor 15k ohm 1/4W	2	AA
R90	VRD-B12EF472J	Resistor 4.7k ohm 1/4W	1	AA
R91	VRD-B12EF682J	Resistor 6.8k ohm 1/4W	1	AA
(5)	VRD-B12EF332J	Resistor 3.3k ohm 1/4W	1	AA
RY1	RRLY-A078DRE0	Relay (OJ-SH-118LM)	1	AG
RY2-3	RRLY-A087DRE0	Relay (VS18MB)	2	AN
SP1	RALM-A007DRE0	Buzzer (PKM22EPT-CA)	1	AF
T1	RTRNPA081DRE0	Touch control transformer	1	AU
CT1-2	RTRN-A060DRE0	Current transformer	2	AH
VRS1	RH-VZA034DRE0	Varistor (10G471K)	1	AD
ZD1	VHEHZ12C1//-1	Zener diode (HZ12C1)	1	AA
ZD2	VHEHZ4C3//-1	Zener diode (HZ4C3)	1	AA
3- 2	FPNLCB471WRK0	Control panel frame assembly	1	AX

REF. NO.	PART NO.	DESCRIPTION	Q'TY	CODE
3- 2-1	GMADIA067WRF0	Display window	1	AE
3- 2-2	HDECAA206WRP0	Decorative metal fittings	1	AU
3- 2-3	HPNLCB155WRF0	Control panel	1	BA
3- 2-4	PCUSUA451WRP0	Cushion	1	AB
3- 3	LANGTA243WRW0	Control panel mounting angle	1	AF
3- 4	XEPSD30P10XS0	Screw; control unit mounting	11	AA
3- 5	XEPSD40P12000	Screw; control panel mounting angle mounting	1	AA
3- 6	XOTSD40P10RV0	Screw; decoration panel mounting for earth	1	AA
3- 7	JKNBKA510WRM0	Knob	1	AE
3- 8	LANGTA304WRP0	Rotary encoder mounting plate	1	AD
3- 9	RVR-BA016WRK0	Rotary encoder	1	AY
3- 10	JBTN-A895WRM0	Select button	4	AE
3- 11	JBTN-A896WRM0	Start button	1	AE
3- 12	DPWBFB195WRU0	Switch unit assembly	1	AP
3- 12-1	FW-VZA165DRE0	Lead wire harness (2-pin)	1	AF
3- 12-2	FW-VZA166DRE0	Lead wire harness (5-pin)	1	AH
3- 12-3	QSW-PA025DRE0	Tact switch (SW1-SW5)	5	AD
3- 13	PCUSUA404WRP0	Select cushion	4	AC
3- 14	PCUSGA401WRP0	Cushion	1	AD
3- 15	MSPRPA082WRE0	Spring	1	AD
3- 16	PCUSUA407WRP0	Water proof cushion B	1	AB
3- 17	PCUSUA408WRP0	Water proof cushion C	1	AC
3- 18	PCUSUA406WRP0	Water proof cushion A	1	AB
3- 19	PSHEGA005WRP0	Water proof sheet	1	AE
3- 20	QW-VZA122WRE0	Earth wire	1	AC
3- 21	XEPSD30P08XS0	Screw; 4mm x 8mm	2	AA
3- 22	XHTSD40P08RV0	Screw; 4mm x 8mm	1	AB
3- 23	LX-WZA049WRE0	Special washer	1	AA

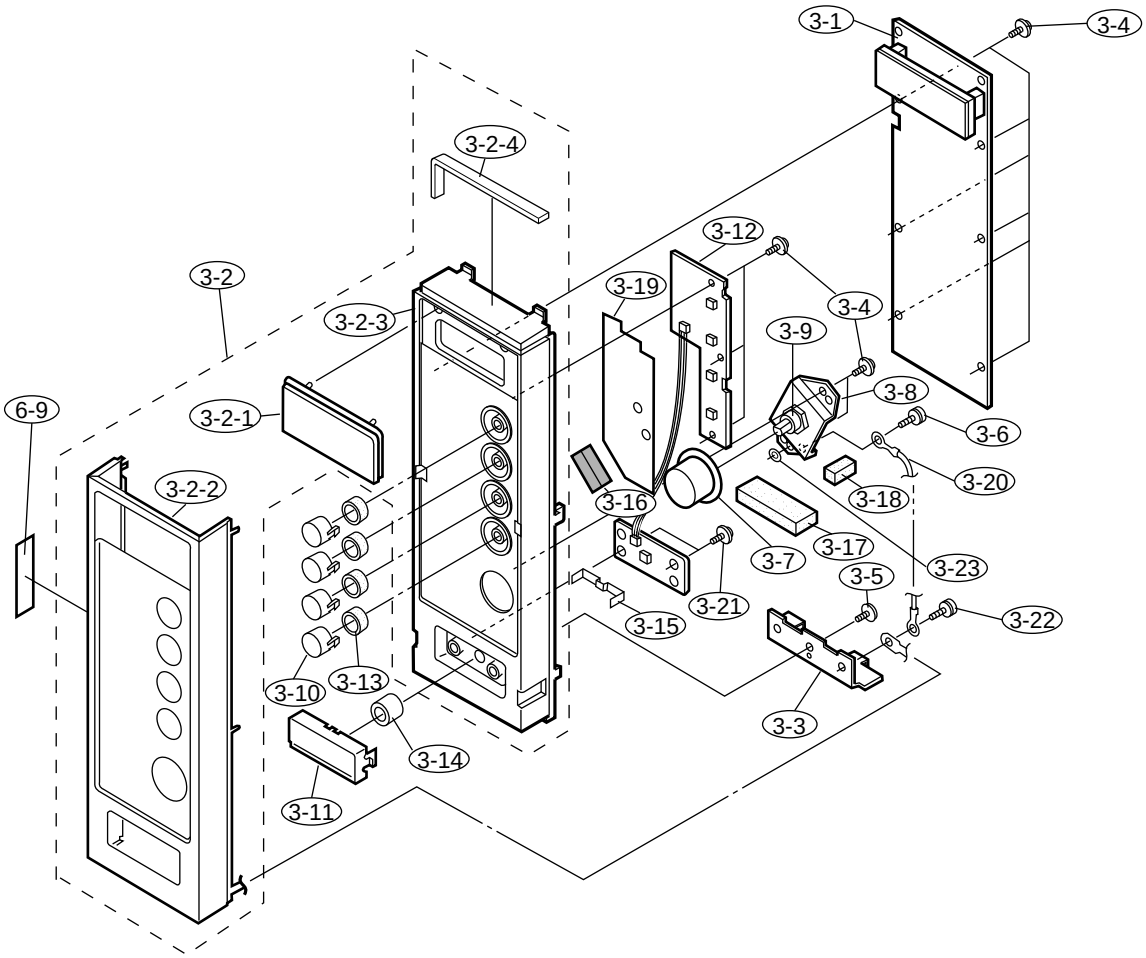
HOW TO ORDER REPLACEMENT PARTS

To have your order filled prompty and correctly, please furnish the following information.

1. MODEL NUMBER 2. REF. NO. 3. PART NO. 4. DESCRIPTION

CONTROL PANEL PARTS

R-23AM



SHARP

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